

Service Manual

Portable Video Cassette Recorder

Panasonic VHS
 Omnivision VI

PV-2600


Vol. 1

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Technical Descriptions*

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Procedures*

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VHS
Panasonic®

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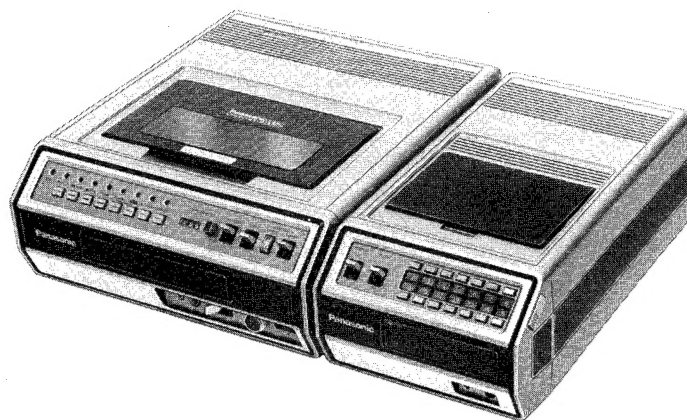
Service Manual

Vol. 1

Summary
Technical Descriptions

Portable Video Cassette Recorder

Panasonic **VHS**
Omnivision IV

PV-2600


SPECIFICATIONS

Power Source:	Deck: DC 12V	Output Level:	Video: VIDEO OUT jack (RCA) 1.0Vp-p 75Ω unbalanced
Power Consumption:	Tuner unit: 120V AC, 60Hz		Audio: LINE OUT jack (RCA) -6dB, 1kΩ unbalanced
	Deck: Approx. 12 watts (Playback mode)		Earphone Jack -20dB, 200Ω unbalanced
	Tuner unit: Approx. 75 watts		RF Modulated: Channel 3 or 4 72dBμ (open voltage), 75Ω unbalanced
Television System:	EIA Standard (525 lines, 60 fields) NTSC color signal	Video Horizontal	
Video Recording		Resolution:	Color: more than 230 lines B/W: more than 270 lines
System:	2 rotary heads, helical scanning system	Signal-to-Noise Ratio:	Video: SP mode: better than 40dB LP mode: better than 40dB SLP mode: better than 40dB (Rohde & Schwarz noise meter)
Luminance:	FM azimuth recording		Audio: SP mode: better than 42dB LP mode: better than 40dB SLP mode: better than 40dB
Color signal:	converted subcarrier phase shift recording	Operation	
Audio Track:	1 track	Temperature:	41°F—104°F (5°C—40°C)
Tape Format:	Tape width 1/2 inch (12.7mm), high density tape	Operating Humidity:	10%—75%
Tape Speed:	SP/1-5/16 i.p.s. (33.35mm/s), LP/21/32 i.p.s. (16.67mm/s), SLP/7/16 i.p.s. (11.12mm/s)	Weight:	Deck: 18.3 lbs. (8.3kg) Tuner unit: 12.6 lbs. (5.7kg)
Record/Playback Time:	360 min. with NV-T120	Dimensions:	Deck: 12-1/4"(W) × 14-3/8"(D) × 5-5/8"(H) 308(W) × 362(D) × 140(H)mm
FF/REW Time:	Less than 4.5 min. with NV-T120		Tuner unit: 7-5/8"(W) × 14-1/8"(D) × 5-5/8"(H) 192(W) × 356(D) × 140(H)mm
Heads:	Video: 2 rotary heads Audio/Control: 1 stationary head Erase: 1 full track erase 1 audio track erase for audio dubbing	Available Tapes:	1/2" VHS video cassette tapes NV-T120 Approx. 810ft. (257m), 2, 4 or 6 hrs. NV-T60 Approx. 417ft. (127m), 1, 2 or 3 hrs.
Input Level:	Video: VIDEO IN jack (RCA) 1.0Vp-p, 75Ω unbalanced Audio: MIC IN jack -70dB, 600Ω -70dB, 600Ω unbalanced LINE IN jack (RCA) -20dB, 100kΩ unbalanced		
TV Tuners:	VHF input Ch2~Ch13 75Ω unbalanced UHF input Ch14~Ch83 300Ω balanced		

Weight and dimensions shown are approximate. Specifications are subject to change without notice.

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INTRODUCTION

This Service Manual Contains technical information which will allow service technicians to understand and service the Panasonic Portable VHS Video Recorder Model PV-2600.

The PV-2600 has many special features including extended recording time of up to 6 hours, portability, feather touch function control, convenient 3-power source system (a battery pack, a car battery, or 120V household AC outlet), simplified and reliable new tape loading method, a directly driven head cylinder, and it is lightweight and very compact.

These features in addition to the basic VHS Format make the PV-2600 an ideal unit for your culture and entertainment.

Note: This service manual does not contain the tuner unit because, the tuner unit for this model is functionally same with the one for former model PV-2200.

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FEATURES

1. Portability

This unit is separated into deck and tuner units to allow the tape deck to be used either independently or with the tuner unit as required. This unit's portability and compact design are a direct result of full scale introduction of IC's and use of a simplified transport section.

2. Feather touch function control

Feather touch function control buttons are used. Use of microprocessor allows mode changing (e.g. from play-back to rewind) without pushing the stop button. (When recording or audio dubbing, however, the stop button must be pushed to change to another mode for prevention of misuse.)

3. Convenient 3-power source system

The recorder can use any of 3 power sources: a battery pack, a car battery, or 120V household AC outlet.

4. Six hours recording and playback

Thanks to the development of a new system for high-density recording of video signals, recordings as long as 6 hours in length on a single tape are possible.

5. Head and capstan servo

A direct drive video head assembly and servo-controlled capstan assure high stability in both the recording and playback modes.

6. Compact and lightweight

Simple construction, the small size of various mechanical parts, and the use of integrated circuitry has resulted in a truly compact, lightweight video cassette recorder.

7. Low power consumption

The use of new circuitry design has resulted in a video cassette recorder with low power consumption.

8. Pause control for temporary stops

The convenient pause control has many useful applications such as instant stops during recording in order to avoid recording commercials or other unwanted material, and instant stops during playback at any desired point where you want to begin recording.

A remote control unit can be used to control the recorder from a distance.

9. Built-in "memory" feature

By simply setting the memory switch and the tape counter, during rewind, the tape will automatically stop at any desired point for subsequent playback.

10. Watch one channel, record another*

Because this model has built-in VHF/UHF tuners, you can record a program on one channel while watching a different program on another channel. This is an appreciated convenience when, as so often happens, two programs you want to see are scheduled at the same time. So watch one, record the other and view it later at your leisure.

11. Unattended recordings while you're out, asleep or busy*

There's no need to miss any program when you leave home, are too busy, taking a nap, or just plain forgetful. All you have to do is set the video timer, and the recording will begin on schedule no matter where you are.

* Notice:

Recording a program on one channel while watching a different program on another channel may not be possible with certain CATV converters. "Unauthorized recording of copyrighted television programs, films, video tapes and other materials may infringe the right of copyright owners and be contrary to copyright laws."

12. Auto-Stop

If the tape is allowed to reach its end during recording or playback the recorder will automatically stop.

13. Playback through any Conventional TV set

With the internal RF converter, the output of the recorder can be viewed on any TV set.

A WORD ABOUT THE CASSETTE

■ Types of Cassette Tape

NV-T120

(for 120, 240 or 360 minutes of recording and playback)

NV-T60

(for 60, 120 or 180 minutes of recording and playback)

In addition to the tapes specified above, the deck will accept any cassette tape which has the **VHS** mark.

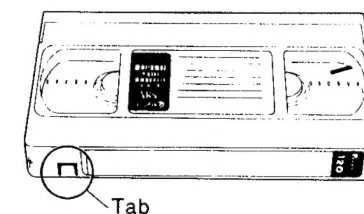
■ Note that video recordings are made across the entire width of the tape and, therefore, two-way recordings cannot be made.

■ The VHS cassette must be inserted into the deck with the label side up. It cannot be used upside down.

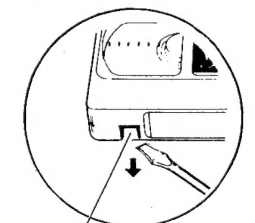
■ To prevent accidental erasure of recorded material, the VHS cassette has a removable tab on the rear side.

The tab can be broken off by a small screwdriver. After it has been removed, the tape can be used for playback only.

To record on a cassette from which the tab has been removed, simply cover the hole with a piece of adhesive tape.

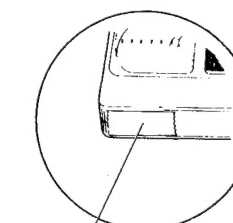


To prevent accidental erasure



Break off the tab with a screwdriver

To record again



Cover the hole with adhesive tape

■ To prevent accidental damage to the tape and recorder caused by moisture from condensation, be sure that the video cassette is kept at room temperature for at least 1 hour before being used.

Use of a cold cassette in a warm recorder could result in the formation of moisture or dew on the tape, which might damage the tape or recorder.

■ To store:

Always put the cassette back in its case before storage.

Store in a vertical position.

Keep in a cool, dry place. Avoid storage in direct sunlight or near sources of heat. Do not place a recorded cassette in a magnetic field, such as that produced by an electric motor or power transformer ...the magnetic field might accidentally erase the tape.

Do not drop or otherwise subject the cassette to shock impact.

For best results, store the cassette with the tape fully rewound.

If the tape has been rewound unevenly, rewind it again to pack the tape properly.

* The tape in a VHS cassette should not be spliced.

Do not attempt to repair or open the cassette.

* Do not touch the tape surface itself. Dirt and oil from your skin may deteriorate the tape coating.

Caution:

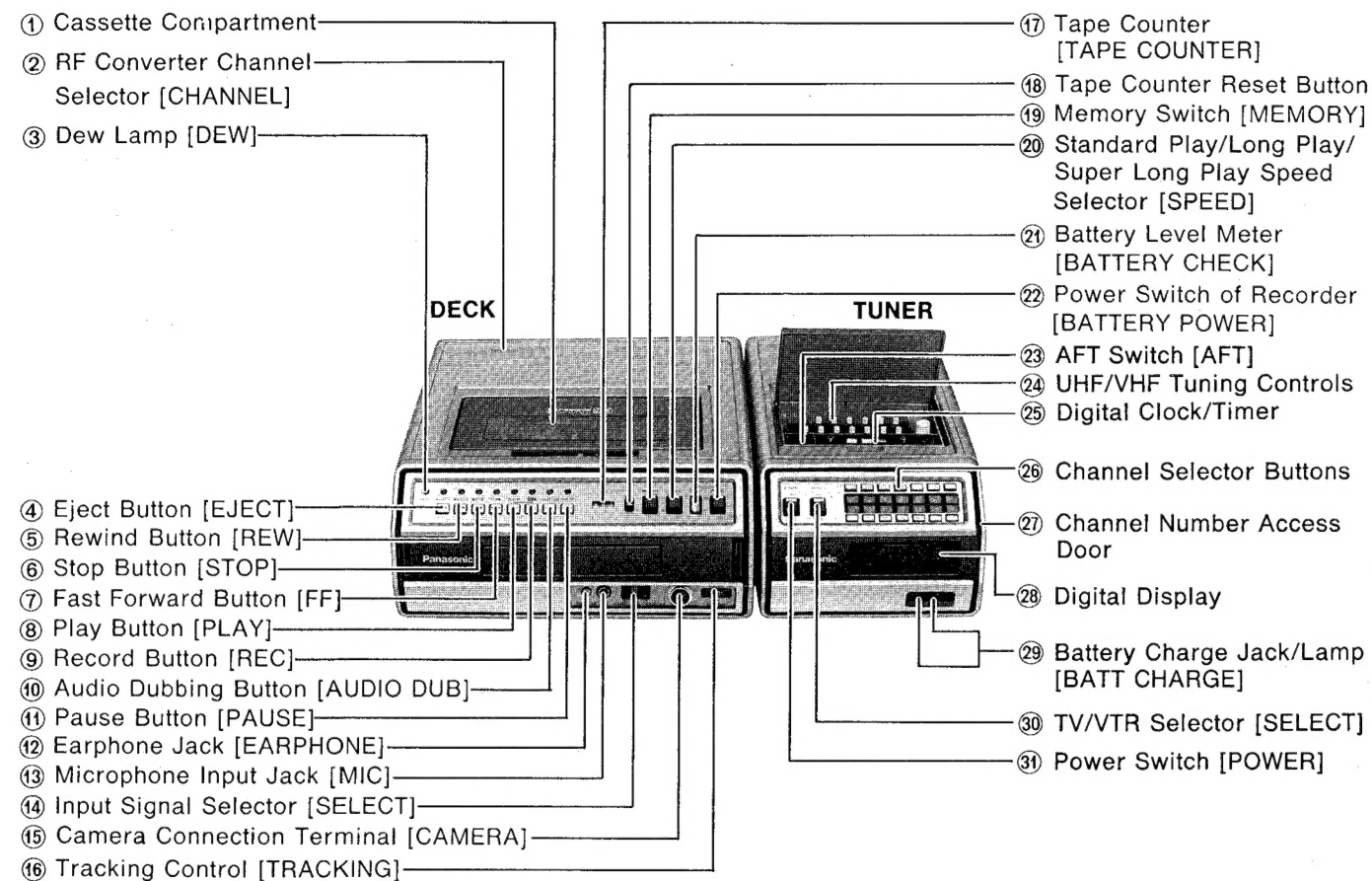
The video cassette can only be used with the window side up, and arrow pointing away from you.

Do not attempt to insert a cassette which is upside down or backwards.

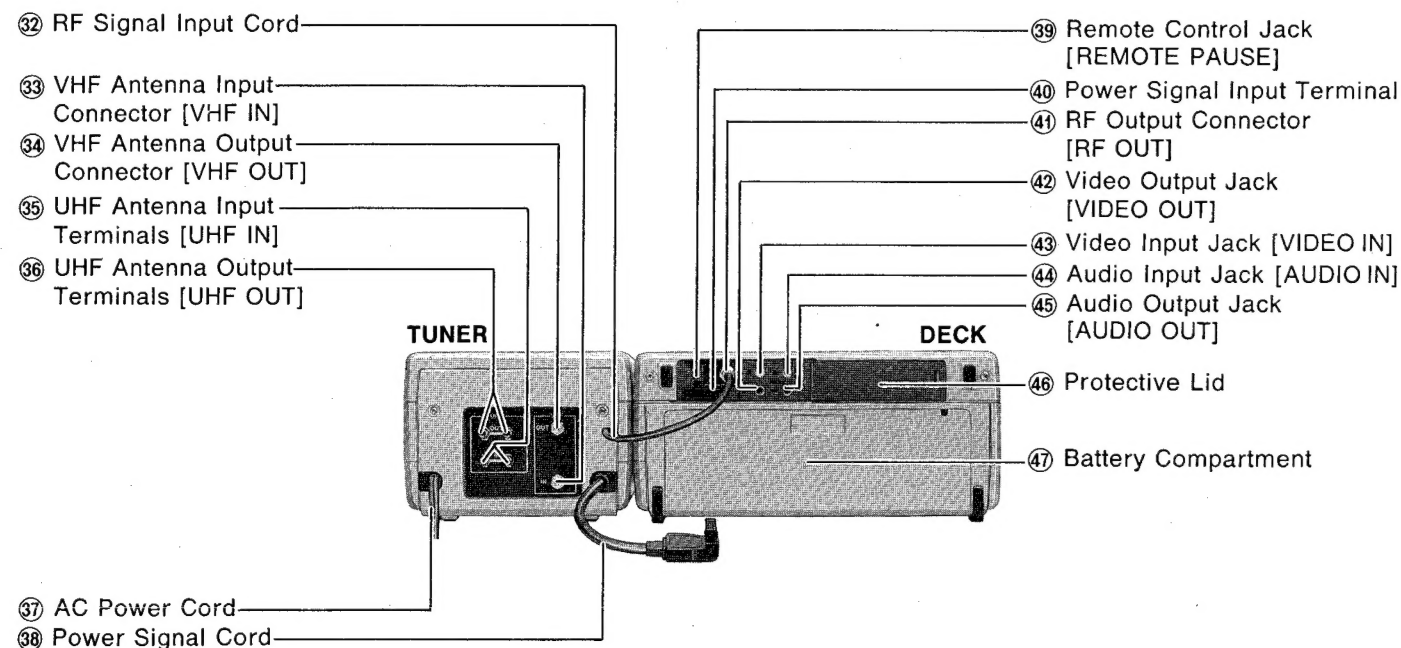
PANASONIC recommends that only cassette tapes that have been tested and inspected for use in 2, 4, and 6 hour VCR machines be used.

MAJOR OPERATING COMPONENTS

TOP and FRONT



REAR



OPERATING COMPONENTS AND THEIR FUNCTIONS

TOP and FRONT

- ① **Cassette Compartment**
For insertion of the video cassette.
- ② **RF Converter Channel Selector [CHANNEL]**
Move the switch to CH3 or CH4 as necessary in your location. See page 31.
- ③ **Dew Lamp [DEW]**
This lamp illuminates if condensation (dew) is present inside the recorder.
When this lamp is on, the recorder will not operate until it has dried sufficiently. See page 41.
- ④ **Eject Button [EJECT]**
To insert or remove a cassette tape, push this button, and the Cassette Compartment ① will raise. Push this button while the tape is moving, such as during playback, fast forward or rewind, and the tape will unload, stop, then the Cassette Compartment ① will raise.
Note:
Power must be supplied to the deck in order to operate the eject mechanism.
- ⑤ **Rewind Button [REW]**
Push this button to rewind the tape.
When in rewind, the tape will stop automatically when fully rewound, or at the counter memory position, if the Memory Switch ⑱ is set to "ON". See page 41.
- ⑥ **Stop Button [STOP]**
Push this button to stop the Recording, Playback, Rewind, Fast Forward, or Audio Dubbing mode.
- ⑦ **Fast Forward Button [FF]**
Push this button to quickly move the tape in the forward direction. The tape will stop automatically when fully forwarded.
- ⑧ **Play Button [PLAY]**
Push this button to play back a recorded tape. If recording is desired, push the Play Button and the Record Button ⑨ simultaneously.
- ⑨ **Record Button [REC]**
This button should be pushed simultaneously with the Play Button ⑧ to start recording both picture and sound.
- ⑩ **Audio Dubbing Button [AUDIO DUB]**
During playback audio dub may be started by pushing Play and Audio Dub at the same time. This is handy when it is desired to narrate over a pre-recorded tape. See page 39.
- ⑪ **Pause Button [PAUSE]**
Push this button to instantly stop the tape movement in either the record or playback modes.
The tape will not unload, but its forward movement will stop.

- ⑫ **Earphone Jack [EARPHONE]**
When the earphone (included) is connected, the audio portion of the recording or playback can be heard through it.
- ⑬ **Microphone Input Jack [MIC]**
This is for the connection of a microphone to record sound onto the tape. It can be used both in recording and for audio dubbing.
- ⑭ **Input Signal Selector [SELECT]**
This switch is used to select between 3 incoming signals from which recordings can be made.
1) In the "CAMERA" position, set to this position if the recording is to be made from a portable video camera connected to this unit.
2) In the "LINE" position, the signal which is connected to the Video Input Jack ④③ and Audio Input Jack ④④ on the rear panel will be sent to the recording circuit.
3) In the "TUNER" position, the signal from the built-in VHF or UHF tuners will be sent to the recording circuit.
- ⑮ **Camera Connection Terminal [CAMERA]**
This is a special terminal exclusively for connection of a portable video camera.
- ⑯ **Tracking Control [TRACKING]**
This control is used to shift the playback scanning of the tape.
Normally, it is left in its center detent position, it should only be adjusted if, upon playback, the picture appears very noisy or streaked. See page 41.
- ⑰ **Tape Counter [TAPE COUNTER]**
This is a digital counter which gives a reference as to how far the tape has moved.
- ⑱ **Tape Counter Reset Button**
Press this button to reset the Tape Counter ⑰ to "000".
- ⑲ **Memory Switch [MEMORY]**
This switch is used if it is desired to quickly find a specific portion of a recorded tape. See page 41.
- ⑳ **Standard Play/Long Play/Super Long Play Speed Selector [SPEED]**
This is the selector which determines what speed will be used for recording, either SP, LP or SLP. Set the switch to SP to record up to a maximum of 2 hours. Set it to LP to record up to a maximum of 4 hours. Set it to SLP to record up to a maximum of 6 hours. This switch has no effect in playback. See page 10, for the section, "EXPLANATION AND USE OF THE STANDARD PLAY/LONG PLAY/SUPER LONG PLAY [SP/LP/SLP] SPEED SELECTOR".

②① Battery Level Meter [BATTERY CHECK]

This meter shows the capacity of power source for battery pack, car battery and tuner unit.

②② Power Switch of Recorder [BATTERY POWER]

This switch is used only when the deck operates on battery. It does not function when the deck is connected with the tuner unit.

②③ AFT Switch [AFT]

This control electronically locks the fine tuner to the desired channel to keep the picture clear at all times. Keep the AFT off when fine-tuning the desired channel, then set it "ON", to lock the picture in.

②④ UHF/VHF Tuning Controls

These controls allow tuning and fine tuning of any desired broadcast in your area. See pages 14~15 for tuning operation.

②⑤ Digital Clock/Timer

This built-in timer constantly displays the time of day and is used for unattended recording. See page 36~38.

②⑥ Channel Selector Buttons

To receive a UHF/VHF broadcast, select the channels (2~83) by pushing these buttons.

②⑦ Channel Number Access Door

This access door is for inserting channel number tabs. See page 16.

②⑧ Digital Display

This is a display for the time of day and indicates preselected program time. See page 36 for further reference.

②⑨ Battery Charge Jack/Lamp [BATT CHARGE]

Connect the external battery pack here to charge. Lamp lights when the battery pack is being charged. (On Model PV-2600, the built-in battery pack and a single external battery pack can be charged simultaneously.)

③① TV/VTR Selector [SELECT]

This switch selects one of two signals which will be seen on the TV.

Place it in the "VTR" position to view playback pictures or to see the picture you are recording. Place it in the "TV" position to use your TV as you normally would.

*** Note:**

When the Power Switch ③① is set to "OFF" position, the switch is automatically set to "TV" position.

*** Reminder**

When viewing your television as you normally do, it is not necessary to turn the Power Switch ③① ON. Antenna connection is automatically switched to your television set by the TV/VTR Selector Switch ③① when Power Switch ③① is set to the "OFF" position.

③① Power Switch [POWER]

This switch is used to turn the tuner unit on and off.

REAR

③② RF Signal Input Cord

For connection to receive RF converter signal from the deck.

③③ VHF Antenna Input Connector [VHF IN]

This is where the VHF antenna or CATV cable is connected to the tuner unit. The connector is a standard type "F" connector and requires that the connector on the antenna lead or CATV cable lead also to be of the "F" type.

③④ VHF Antenna Output Connector [VHF OUT]

This connects to the VHF input of a conventional TV receiver. The connector is a standard type "F" connector and requires the cable used between the tuner unit and your TV also should have type "F" connectors.

③⑤ UHF Antenna Input Terminals [UHF IN]

This is where the UHF antenna is connected to the tuner unit. The terminals are screw-type designed to be used with 300 ohm twin-lead cable, which is usually used with UHF antennas.

③⑥ UHF Antenna Output Terminals [UHF OUT]

This is for connection to the UHF input of a conventional TV receiver, if desired.

③⑦ AC Power Cord

For connection to 120V AC 60Hz electric outlet.

③⑧ Power Signal Cord

This cord is for sending the power signal from tuner unit to the deck's Power Signal Input Terminal ④①.

③⑨ Remote Control Jack [REMOTE PAUSE]

Tape movement can be temporarily stopped (pause) from a distance by connecting the remote pause control (included) to this jack.

④① Power Signal Input Terminal

This terminal is set for receiving power signal from tuner unit by connecting this to tuner unit Power Signal Cord ③⑧.

④② RF Output Connector [RF OUT]

This is the signal output connector from the RF converter used with the recorder.

④③ Video Output Jack [VIDEO OUT]

For direct connection to a video monitor, or video camera. Not used with a conventional TV receiver.

④④ Video Input Jack [VIDEO IN]

For connection of a video camera or other input video signal to be recorded.

④⑤ Audio Input Jack [AUDIO IN]

This connector accepts the audio signal from an external source. This connector can be used to record the audio from a Hi-Fi amplifier or another type video or audio recorder.

Note:

If a signal is applied to the Audio Input Jack at the same time that a microphone is connected to the Microphone Input Jack ④③, only the signal from the microphone will be recorded.

④⑥ Audio Output Jack [AUDIO OUT]

The audio signal from either the recording source, or the playback audio is present at this connector. The signal can be connected to a video monitor or Hi-Fi amplifier or to another type video recorder if desired.

④⑦ Protective Lid

Keep the protective lid open when the terminal at the rear side of the deck is in use and always close the lid when it is not in use.

④⑧ Battery Compartment

Place the battery pack in this compartment and connect the plug of the battery pack to the connection terminal of the deck, and then reattach the cover. When the car battery is in use, insert the plug into the jack in the same way as stated above.

VHS-PRINCIPLE OF OPERATION

Basic Video Tape Recording

To understand the VHS format, it is wise to first review the basic principles of video tape recording.

Like audio tape recording, video information is stored on magnetic tape by means of a small electromagnet, or head. The two poles of the head are brought very close together but they do not touch. This creates magnetic flux to extend across the separation (gap), as shown: Fig. 1.

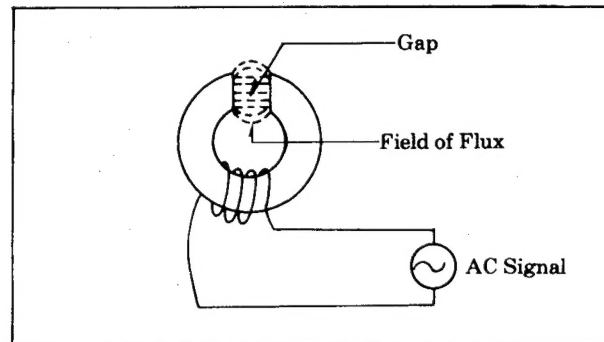


Fig. 1

If an AC signal is applied to the coil of the head, the field of flux will expand and collapse according to the rise and fall of the AC signal. When the AC signal reverses polarity, the field of flux will be oriented in the opposite direction and will also expand and collapse. This changing field of flux is what accomplishes the magnetic recording. If this flux is brought near a magnetic material, it will become magnetized according to the intensity and orientation of the field of flux. The magnetic material used is oxide coated (magnetic) tape. Using audio tape recording as an example, if the tape is not moved across the head, just one spot on the tape will be magnetized and will be continually re-magnetized. If the tape is moved across the tape, specific areas of the tape will be magnetized according to the field of flux at any specific moment. A length of recorded tape will therefore have on it areas of magnetization representing the direction and intensity of the field of flux. For instance:

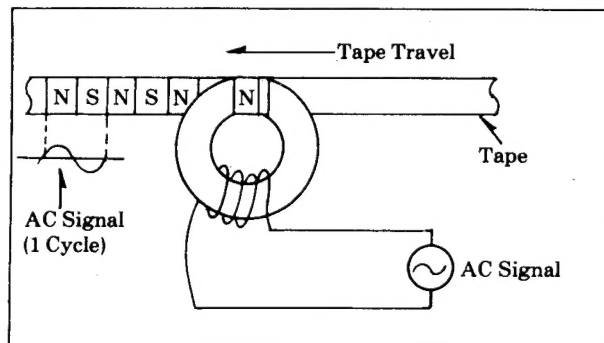


Fig. 2

The tape will have differently magnetized regions, which can be called North (N) and South (S), according to the AC signal. When the polarity of the AC signal changes, so does the direction of magnetization on the tape, as shown by one cycle on the AC signal (see Fig. 2). If the recorded tape is then moved past a head whose coil is connected to an amplifier, the regions of magnetization on the tape will set up flux across the head gap which will in turn induce a voltage in the coil to be amplified. The output of the amplifier, then is the same as the original AC signal. This is essentially what is done in audio recording, with other methods for improvement like bias and equalization.

There are some inherent limitations in the tape recording process which do effect video tape recording, so they will be examined now. As shown in Fig. 2, the tape has North and South magnetic fields which change according to the polarity of the AC signal. What if the frequency of the AC signal were to greatly increase? If the speed of the tape past the head (head to tape speed) is kept the same, the changing polarity of the high frequency AC signal would not be faithfully recorded on the tape, as shown in Fig. 3.

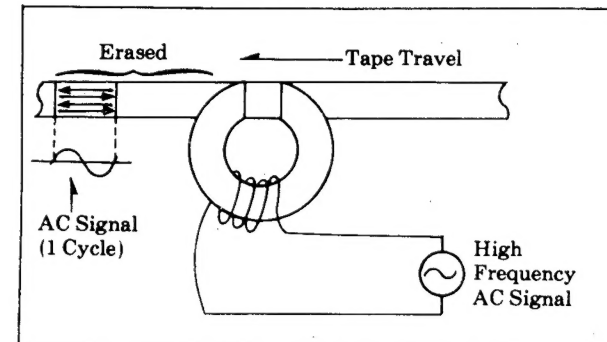


Fig. 3

As the high frequency AC signal starts to go positive, the tape will start to be magnetized in one direction. But the AC signal will very quickly change its polarity, and this will be recorded on much of THE SAME PORTION of the tape, so North magnetic regions will be covered by South magnetic regions and vice versa. This results in zero signal on the tape, or self-erasing. To keep the North and South regions separate, the head to tape speed must be increased. (See Fig. 3.)

When recording video, frequencies in excess of 4 MHz may be encountered. Through experience, it is found that the head to tape speed must be in the region of 10 meters per second in order to record video signals.

The figure of 10 meters per second was also influenced by the size of the head gap. Clearly, the lower the head to tape speed, the easier it is to control that speed. If changes in head gap size were not made, the necessary head to tape speed would have been considerably higher. How the gap size influences this can be explained by Fig. 4.

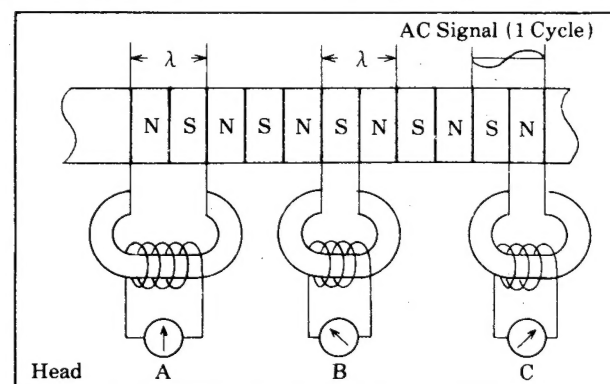


Fig. 4

Assume a signal is already recorded on the tape. The distance on the tape required to record one full AC signal cycle is called the RECORDED WAVELENGTH or λ . Head A has a gap width equal to λ . Here, there is both North and South oriented magnetization across the gap.

This produces a net output of zero since North and South cancel. Heads B and C have a maximum output because there is just one magnetic orientation across their gaps.

Maximum output occurs in heads B and C therefore, because their gap width is $1/2\lambda$. (Heads B and C would also work if their gap width is less than $1/2\lambda$.) The same is also true for recording. The maximum useable (no self-erasing) transfer of magnetic energy to the tape occurs when the gap width, G, can be expressed as:

$$G \leq \frac{\lambda}{2}$$

The RECORDED WAVELENGTH, can be expressed as:

$$\lambda = \frac{V}{f}$$

$$\text{So, } G \leq \frac{V}{2f}$$

where V is the head to tape speed and f is the frequencies to be recorded.

as V increases, G is also allowed to increase for the same MAXIMUM frequency. Conversely if G is made very small, V is allowed to be reduced.

In practice, G can be made as small as (and smaller than) $1\mu\text{m}$ (1×10^{-6} meters) and this puts V in the area of 10 meters per second. A head to tape speed of 10 meters per second is a very high speed, too high in fact to be handled accurately by a reel to reel tape machine of reasonable size. Also, tape consumption on a high speed reel to reel machine is tremendous.

The method employed in video recording is to move the video heads as well as the tape. If the heads are made to move fast, across the tape, the linear tape speed can be kept very low.

In 2-head helical video recording (the only format which will be discussed here) the video heads are mounted in a rotating drum or cylinder, and the tape is wrapped around the cylinder. This way, the heads can scan the tape as it moves. When a head scans the tape, it is said to have made a TRACK. This can be seen in Fig. 5.

In 2-head helical format, each head, as it scans across the tape will record one TV field, or 262.5 horizontal lines. Therefore, each head must scan the tape 30 times per second to give a field rate of 60 fields per second.

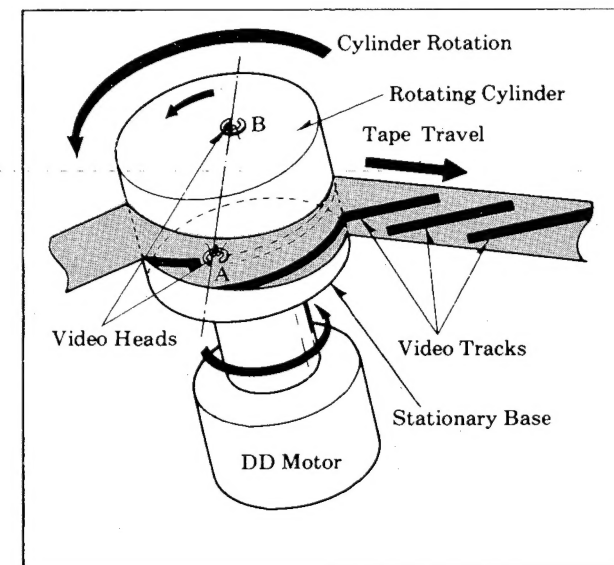


Fig. 5

The tape is shown as a screen wrapped around the head cylinder to make it easy to see the video head. There is a second video head 180° from the head shown in front. Because the tape wraps around the cylinder in the shape of a helix (helical) the video tracks are made as a series of slanted lines. Of course, the tracks are invisible, but it is easier to visualize them as line. The two heads "A" and "B" make alternate scans of the tape.

An enlarged view of the video tracks on the tape can be shown:

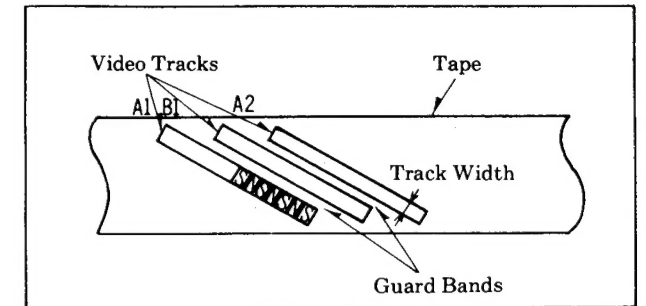


Fig. 6

Refer to Fig. 6. The video tracks are the areas of the tape where video recording actually takes place. The guard bands are blank areas between tracks, preventing the adjacent track's crosstalk from appearing on the track where the video head is tracing.

There is one more point about video recording which will be discussed here. Magnetic heads have the characteristic of increased output level as the frequency increases. Then, as determined by the gap width, the maximum output occurs at approximately $G = \frac{V}{2f}$.

In practice, the lower frequency output of the heads is boosted in level to equal the level of the higher frequencies. This process, as also used in audio applications, is called equalization.

Video frequencies span from DC to about 4 MHz. This represents a frequency range of about 18 octaves. 18 octaves is too far a spread to be handled in one system (one machine). For instance, heads designed for operation at a maximum frequency of 4 MHz will have very low output at low frequencies. Since there is 6dB/octave attenuation, $18 \times 6 = 108\text{dB}$ difference appears. In practice this difference is too great to be adequately equalized. To get around this, the video signal is applied to an FM modulator during recording. This modulator will change its frequency according to the instantaneous level of the video signal.

The energy of the FM signal lies chiefly in the area from about 1 MHz to 8 MHz, just three octaves. Heads designed for use at 8 MHz can still be used at 1 MHz, because the output signal can be equalized. Actually speaking, heads are designed for use up to about 5 MHz. Therefore, some FM energy is lacked but it does not affect the playback video signal, because it is resumed in the playback process.

Upon playback, the recovered FM signal must be equalized then demodulated to obtain the video signal.

CONVERTED SUBCARRIER DIRECT RECORDING METHOD

The one method of color video recording that will be discussed here is the converted subcarrier method. In order to avoid visible beats in the picture caused by the interaction of the color (chrominance) and brightness (luminance) signals, the first step in the converted subcarrier method is to separate the chrominance and luminance portions of the video signal to be recorded. The luminance signal, containing frequencies from DC to about 4 MHz, is then FM recorded, as previously described. The chrominance portion, containing frequencies in the area of 3.58 MHz is down-converted in frequency in the area of 629 kHz. Since there is not a large shift from the center frequency of 629 kHz, this converted chrominance signal is able to be recorded directly on the tape. Also note that the frequencies in the area of 629 kHz are still high enough to allow equalized playback. In practice, the CONVERTED CHROMINANCE signal and the FM signals are mixed and then simultaneously applied to the tape. Upon playback, the FM and converted chrominance signals are separated. The FM is demodulated into a luminance signal again. The converted chrominance signal is re-converted back up in frequency area of 3.58 MHz. The chrominance and luminance signals are combined which reproduces the original video signal.

General Introduction to VHS SP, LP and SLP Formats

The Panasonic VHS Model PV-2600 Video Cassette Recorder was designed to give the user the capability to make recording up to 6 hours in length on a single cassette.

But because there are other VHS recorders available which are not able to make 6 hour recordings, it is desirable to make the Panasonic PV-2600 capable of playing back not only its own 6 hour tapes, but also the tapes made by these other VHS units. This makes the PV-2600 compatible with all other existing VHS type units.

In the SP Mode—the PV-2600 will record/playback for a maximum of 2 hours, just as all other VHS type recorders are able to do. An SP cassette, therefore can be played on all existing VHS units.

In the LP Mode—The PV-2600 will record/playback for a maximum of 4 hours. In the SLP Mode—The PV-2600 will record/playback up to a maximum of 6 hours on a single cassette. An SLP cassette can only be played on SP/LP/SLP VHS machines.

There are difference between these 3 VHS formats (SP, LP and SLP) and they will be pointed out as necessary in the sections that follow.

1. HIGH DENSITY RECORDING SYSTEM

A. Reduction of Track Width

Let's consider first the SP Mode. In order to allow a recording time of up to 2 hours, twice as long as ordinary VTR's, some means of increasing the recording density must be found. Increasing the recording density means that the tape must be more densely filled with information.

One method of accomplishing this is to reduce the video track width and guard band. This way, more tracks can be stored on the tape.

A typical video track width in other helical applications is in the area of $100\mu\text{m}$ (microns, $1\mu\text{m} = 1 \times 10^{-6}$ meters).

In VHS/SP, the track width is $30\mu\text{m}$. This means that the actual size of the video head must be reduced because the head size determines the track width.

In VHS/LP, the effective track width becomes $29\mu\text{m}$. There is no change in head size, but as will be shown later, the useable track area is reduced.

In VHS/SLP, the effective track width becomes $19.3\mu\text{m}$. There is also no change in head size, but as will also be shown later, the useable track area is much reduced.

B. Guard Band

The Guard Band in the SP Mode represents wasted space on the tape. This space could be utilized to increase the recording density even more. See Fig. 7-1

In the VHS/LP and SLP Modes, the guard band is eliminated. The video tracks are brought together so that they actually overlap. Clearly this represents zero guard band. See Fig. 7-2 and Fig. 8. Because the video tracks actually overlap, adjacent track crosstalk becomes a problem. This occurs during playback, when a particular head also picks up information from an adjacent track and the overlapped region. The overlapped region contains information from 2 adjacent tracks which is actually partially erased, but can still be a source of unwanted crosstalk.

Because the inadvertent crosstalk does produce undesirable interference on the playback screen, a new recording method is used to prevent the pickup of crosstalk. This new method as will be described later is called Azimuth Recording.

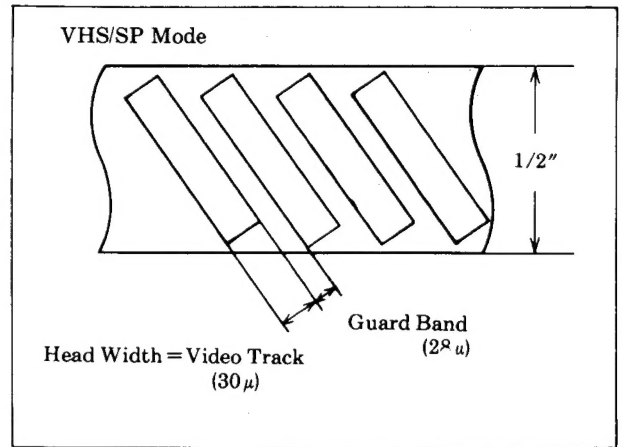


Fig. 7-1

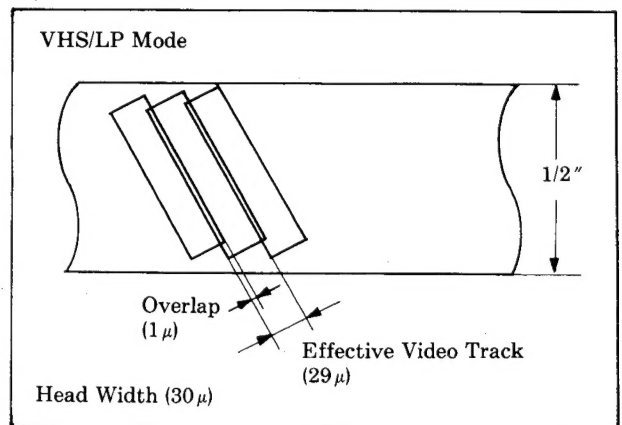


Fig. 7-2

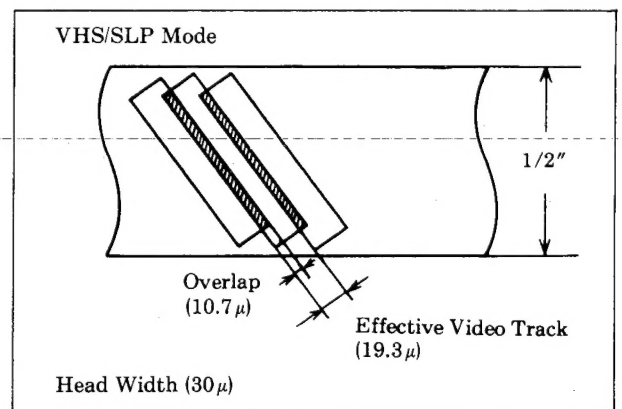


Fig. 8

C. Reduction of Tape Speed

In VHS/SP, the linear tape speed is 33.35 mm/sec.

Now, for the LP and SLP Modes, we must reduce the linear tape speed so that the guard bands disappear, and track overlap occurs.

Linear tape speed is 16.67 mm/sec in VHS/LP and 11.12 mm/sec in VHS/SLP.

The reduction of linear tape speed means that less tape moves past the head cylinder per unit time, and since the rotational speed of the heads is unchanged, the tracks become more closely spaced.

The higher the linear tape speed, the wider the guard bands become. The lower the speed, the narrower they become.

2. NEW VIDEO HEADS

A. The Need for New Video Heads

We have already discussed the reduced track width. This reduction requires the use of a smaller video head. Just making them smaller does not make them better. With less of actual head material to work with, the magnetic properties of the head suffers. To offset this a change in the head material is in order. Because the VHS recorder is designed to be small, a reduction in the size of the head cylinder was called for.

A reduction in the size (diameter) of the head cylinder changes the head to tape speed. Remember, the head to tape speed affects the high frequency recording capability of the head. To offset this problem, the head gap size was reduced.

As mentioned before, Azimuth Recording is utilized in VHS. The heart of the Azimuth Recording process is in the video heads themselves. This requires still another change in head design.

B. Hot Pressed Ferrite

The use of Hot Pressed Ferrite as video head material in VHS helps to improve the characteristics of the smaller head. The Hot Pressed Ferrite also has uniform domain orientation which further improves the head characteristics. It has been proven in many tests that the use of Hot Pressed Ferrite produces a superior video head.

C. Head Gap

1. Width

As explained, the need for smaller head gap size became apparent. In VHS, the video heads have gap widths of a mere $0.3\mu\text{m}$ (0.3×10^{-6} meters).

This is quite a contrast with ordinary video heads used in other helical applications whose gap widths are typically in the area of $1\mu\text{m}$.

2. Azimuth

Azimuth is the term used to define the left to right tilt of the gap if the head could be viewed straight on.

In previous VTR applications the azimuth was always set to be perpendicular to the direction of the head travel across the tape, or more simply, the video track. Fig. 9 helps explain this.

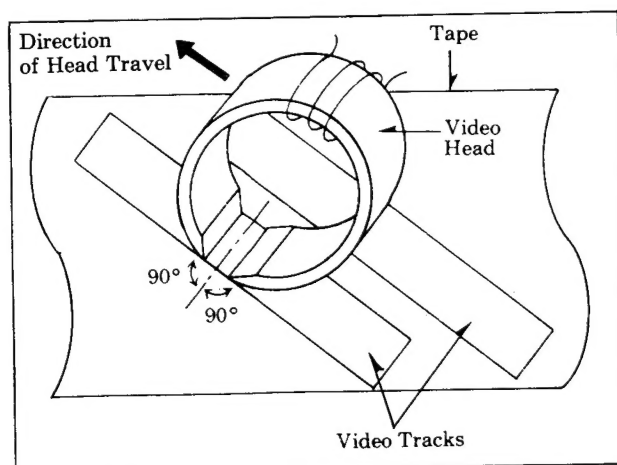


Fig. 9

Fig. 9 shows that the gap is perpendicular to (90°) the head's movement across the tape. We can think of this standard as a perfect azimuth of 0° .

In VHS, the video heads have a gap azimuth other than 0° . And more, one head has a different azimuth from the other. The 2 values used in VHS are azimuth of $+6^\circ$ and -6° . Refer to Fig. 10 and Fig. 11.

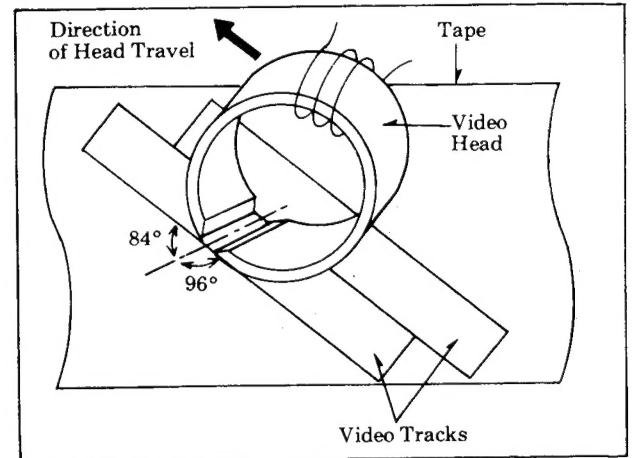


Fig. 10

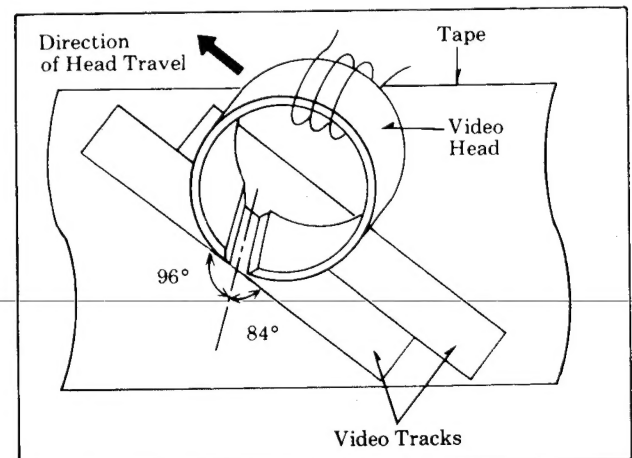


Fig. 11

These heads make the VHS format different from most other VTR formats. Exactly how the azimuths of $\pm 6^\circ$ helps to keep out adjacent track interference is explained next.

3. AZIMUTH RECORDING

Azimuth Recording is used in VHS to eliminate the interference or crosstalk picked up by a video head. Again, because adjacent video tracks touch, or crosstalk, a video head when scanning a track will pick up some information from the adjacent track. The azimuths of the head gaps assure that video head "A" will only give an output when scanning across a track made by head "A". Head "B", therefore, only gives an output when scanning across a track made by head "B". Because of the azimuth effect, a particular video head will not pick up any crosstalk from an adjacent track. Let's examine this more closely.

In Fig. 12, we can see the VHS/LP and VHS/SLP video tracks with not-to-scale North and South magnetized regions on them.

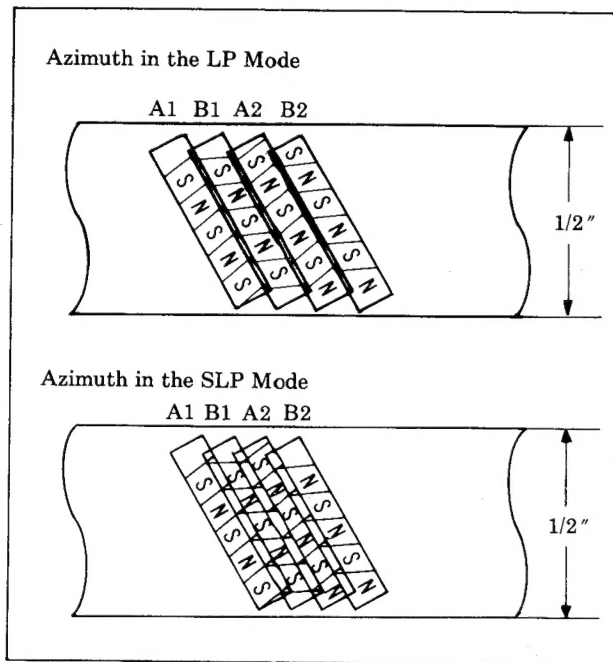


Fig. 12

It can also be seen that these N or S regions are not perpendicular to the track, they have -6° azimuth in tracks A1, A2; and $+6^\circ$ azimuth in tracks B1, B2.

If we take track A1 and darken the N regions, it becomes easier to see. Refer to Fig. 13.

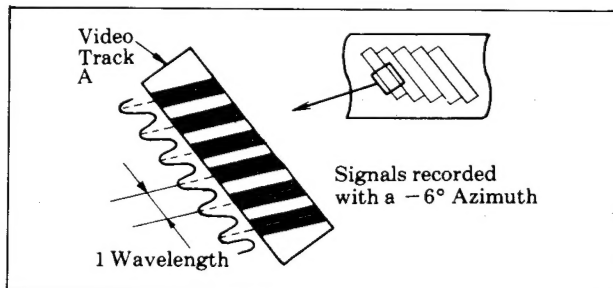


Fig. 13

In Fig. 14, we see the information on track A, made by head "A". Imagine now that head "A" is going to playback this track, by superimposing the head over the track. Clearly, the gap fits exactly over the N and S regions, so that at any moment there is either an N region or an S region or an N to S (or S to N) transition across the gap. This produces maximum output in head "A". Now, visually superimpose the "B" head over the track.

Here there are N and S regions across the gap at the same time, at any given moment. Remember that simultaneous N and S regions across the gap cause cancellation, and therefore no output. Looking at Fig. 14, we can see that the gap width is equal to $1/2$ the recorded wavelength. Recall that this occurs at the highest frequency which is to be recorded.

So therefore, the azimuth effect works at these high frequencies.

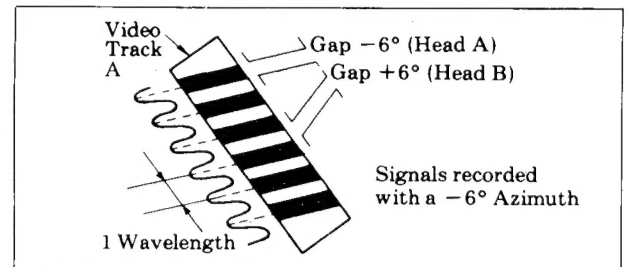


Fig. 14

But what happens at lower frequencies? In Fig. 15, we see a diagram similar to Fig. 14, except the recorded wavelength is longer, which represents a lower frequency.

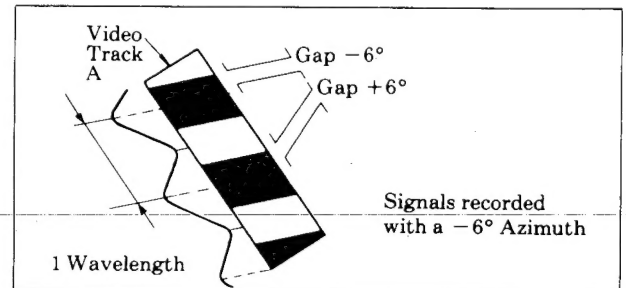


Fig. 15

Again, visually superimpose the heads over the track. Head "A" is the same as before. But look at head "B". There is much less cancellation across the gap, and its output is close to that of head "A". Therefore, we see where the azimuth effect is dependent on frequency. The higher the frequency, the better the azimuth effect. The lower the frequency, the lower the separation by azimuth effect.

4. VHS COLOR RECORDING SYSTEM

Because there is insignificant azimuth effect at lower frequencies, a new color recording system must be adopted.

The fact that crosstalk occurs at lower frequencies cannot be changed, this happens right at the tape during playback. The method adopted processes the crosstalk component signals from the heads so that they are eliminated. It is important to realize that the crosstalk DOES STILL OCCUR. It is the recording/playback circuitry that performs the elimination.

In ordinary Helical VTR's using converted subcarrier direct recording, the phase of the chrominance signal is untouched, recorded directly onto the tape. The chrominance signal and its phase can be represented by vectors. Vectors graphically represent the amplitude and phase of ONE frequency. In this discussion, we will consider (for simplicity) the chrominance signal to be of one frequency. As an example of vectors, see Fig. 16. The length of any vector represents its amplitude.

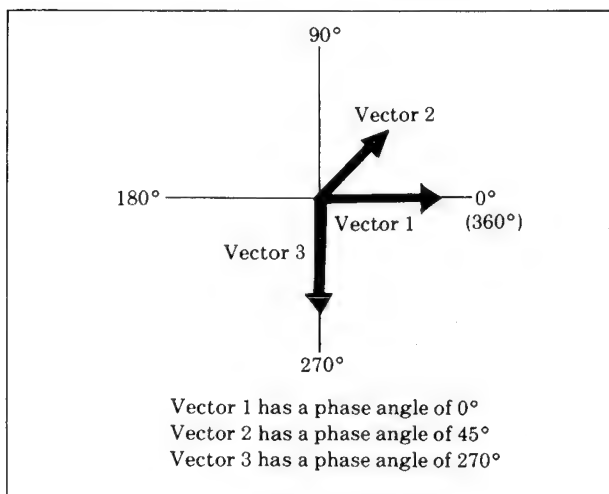


Fig. 16

We know that the azimuth effect will not work at the lower frequencies. And since the color information in VHS is recorded at low-converted frequencies, a new method of color recording was adopted.

Vector Rotation in Recording is actually a phase shift process that occurs at a horizontal rate, 15,734 Hz.

The chrominance signal can be represented by a vector, showing amplitude and phase. (↑)

In ordinary Helical Scan VTR's the vector is of the same phase for every horizontal line, on every track as shown in Fig. 17.

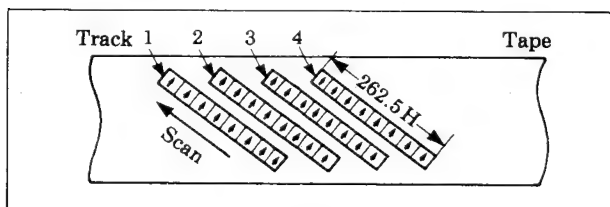


Fig. 17

In VHS, we still convert the 3.58 MHz down to a lower frequency, namely 629 kHz, but the new color method used in VHS format is a process of vector rotation. During recording the CHROMINANCE phase of each horizontal line is shifted by 90°. For head "A" (CHANNEL 1) we ADVANCE the CHROMINANCE phase by 90° per horizontal line (H).

For head "B" (CHANNEL 2) we DELAY the chrominance phase 90° per H.

VECTOR (PHASE) ROTATION:

CHANNEL 1 +90°/H

CHANNEL 2 -90°/H

Fig. 18 shows what this looks like on tape for VHS/LP.

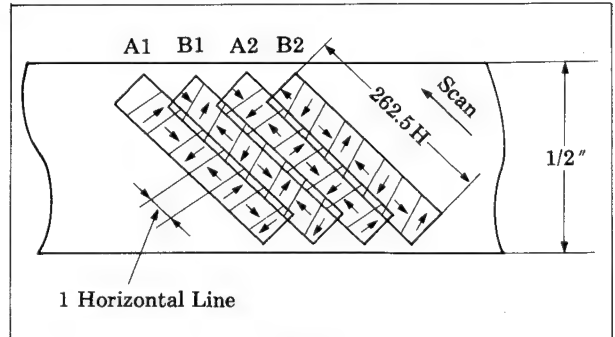


Fig. 18

Now assume that head "A" plays back over track A1 it will produce a vector output as such:

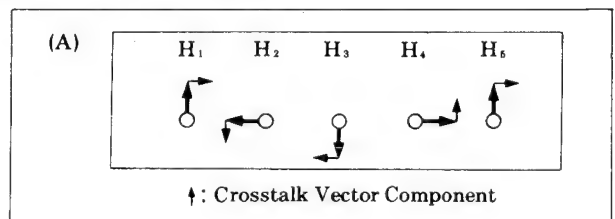


Fig. 19

Head "A" when tracking over A1 will have an output consisting of the main signal (large vectors) and some crosstalk components (small vectors).

Fig. 19, then is a vector representation of the playback chrominance signal from the head.

One of the most important things done in the playback process is the restoration of the vectors to their original phase. This is done by the balanced modulator in the playback process.

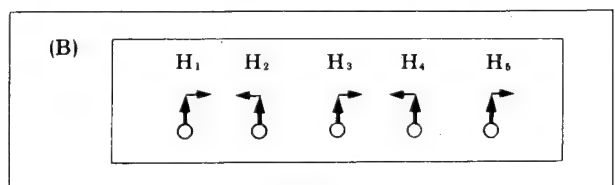


Fig. 20

This restored signal is then split 2 ways. One path goes to one input of an adder. The other path goes to a delay line which delays the signal by 1 H. The output of the delay line goes to the other input of the adder. Fig. 21 explains.

As can be seen in Fig. 23, the crosstalk component has been eliminated after the first H line. We have now a chrominance signal free of adjacent channel crosstalk.

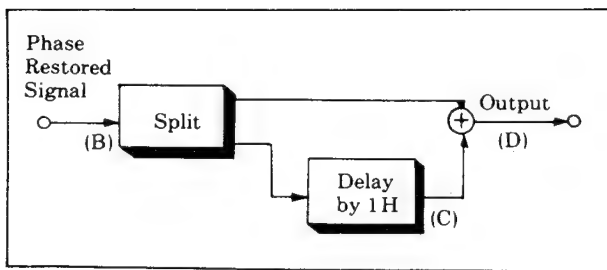


Fig. 21

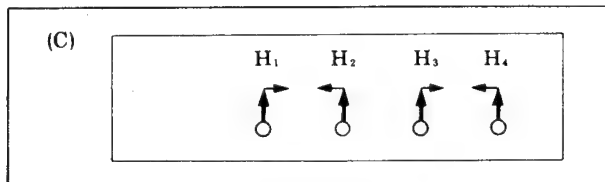


Fig. 22

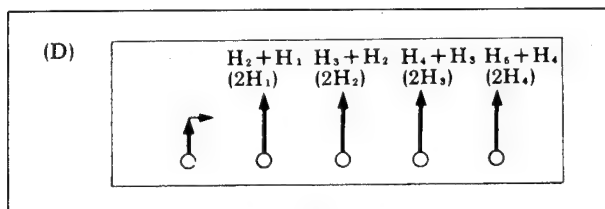


Fig. 23

The double output in Fig. 23 is not a problem because it can always be reduced. The process of adding a delayed line to an undelayed line is permissible because any 2 adjacent lines in a field contain nearly the same chrominance information.

So, if 2 adjacent lines are added, the net result will produce no distortion in the playback picture.

In conjunction with the crosstalk elimination is the re-conversion of the chrominance 629kHz to its original 3.58MHz. Now the color signal is totally restored.

This vector rotation recording method is also used in the SP and SLP modes.

5. THE RECORDED SIGNAL

SP MODE

Video signals, as stated before contain frequencies between DC and about 4MHz.

In converted subcarrier direct recording, the luminance and chrominance portions of the signal are separated.

This process of separation reduces somewhat the frequency range of the luminance and chrominance signals. Since the VHS/SP color system is a form of converted subcarrier direct recording, it too encounters this effect. The frequency ranges of the separated luminance and chrominance signals can be shown. See Fig. 24.

When the luminance signal is FM modulated, it produces an FM signal which occupies a new area in the spectrum.

It was explained before that the instantaneous level of the video signal sets the instantaneous frequency of the FM carrier.

In VHS/SP the lowest level of the video signal, sync tip, sets the FM carrier to 3.4MHz. Peak white portions of the video signal set the FM carrier to 4.4MHz. Carrier deviation is therefore from 3.4 to 4.4MHz. When generating an FM signal, sidebands are also produced. These sidebands lie above the 4.4MHz carrier swing and below the 3.4MHz carrier swing. See Fig. 25.

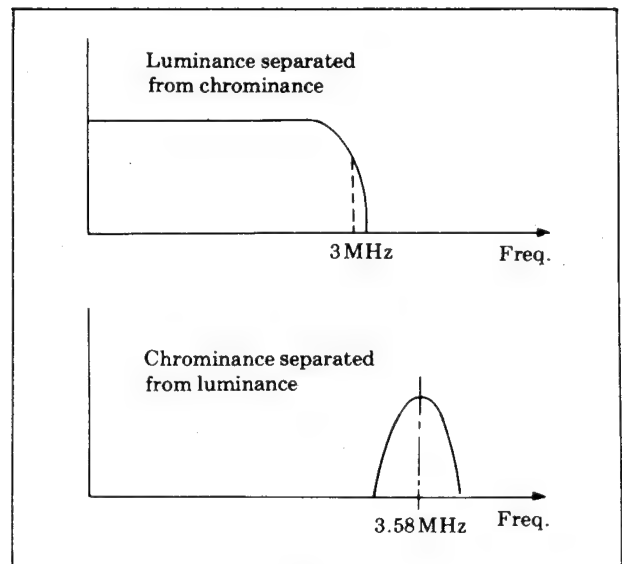


Fig. 24

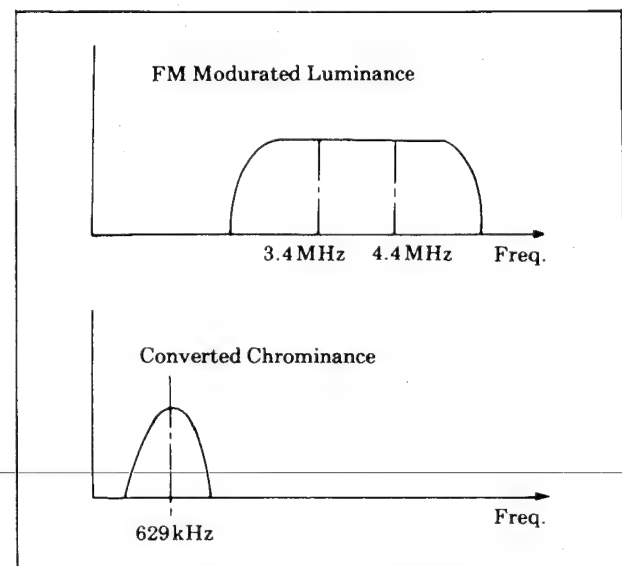


Fig. 25

When the chrominance signal is converted down to 629kHz it will lie below the lower sidebands of the FM modulated luminance signal. Also see Fig. 25.

The FM and converted chrominance signals are mixed before being recorded. The actual signal that is applied to the tape is shown in Fig. 26.

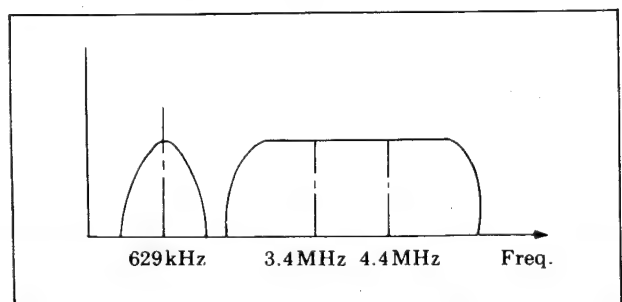


Fig. 26

LP MODE

The recorded signal in the LP Mode is considerably different from that used in the SP Mode.

Like the SP Mode, the chrominance and luminance signals are separated as shown in Fig. 24.

But from here on, things are treated differently. Let's examine again the video tracks on the tape of an LP recording.

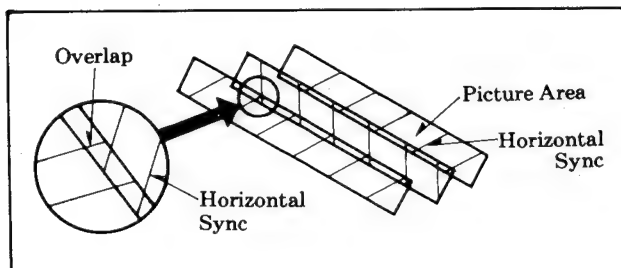


Fig. 27

Notice in Fig. 27 that the tracks do overlap, and that any picture area of any track does not line up perfectly with the picture area of the adjacent tracks. (No horizontal sync alignment.). Let's pull several horizontal line segments off of the track for greater detail.

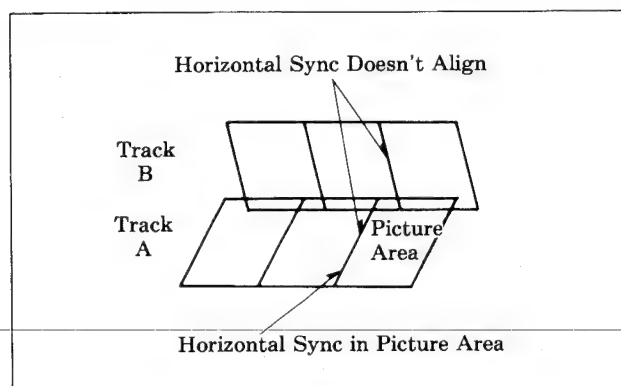


Fig. 28

As can be seen in Fig. 28, the horizontal sync portion of track B lies somewhere in the picture area of track A, for any given horizontal line segment.

Assume that track A was recorded first. Then, as track B is laid down, the 3.4MHz Horizontal Sync. section of "A" will produce a beat with the portion of track B that covers it. Although the entire overlapping region will produce beats, the beat caused by the Horizontal Sync is most noticeable because the sync tip FM frequency never changes, whereas the FM frequency for the picture portion is constantly changing.

This beat is visible on the screen, so measures must be taken to eliminate it. The method employed is called FM Interleaving Recording.

Note that beats are not the same as adjacent track crosstalk. Azimuth recording prohibits crosstalk pickup. But, the beat produced is a new frequency, it was not present in the video signal, it is the result of laying one track over another. The beat signal has no true azimuth, therefore, it will be detected by both video heads.

The FM Interleaving Recording Method does not actually eliminate the beat, but rather places it at such a frequency so that no beat can be detected on the screen.

It is a fact in the NTSC Color Television System that video frequencies which are an odd multiple of $1/2$ the horizontal line frequency (of 15,734Hz) have the property called "interleaving". Interleaving signals appear on the TV screen in a rather special way. Between any 2 adjacent lines, the signals are out of phase, as shown in Fig. 29 by the solid lines:

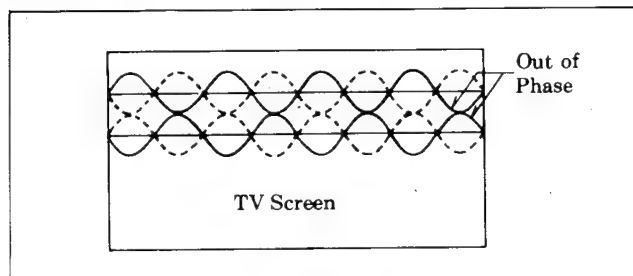


Fig. 29

Because the 2 lines are very close, the human eye tends to integrate them. The out-of-phase signals will virtually be cancelled, undiscernable by the viewer.

Now, when the frame is completed and the next frame begins, the signal on the top line will be out of phase with what was previously scanned. This is shown by the dotted line. This will cancel any phosphor persistence from the previous scan. Thus, interleaved frequencies, for all purposes, do not create interference on the TV screen.

This interleaving is accomplished by raising the sync tip FM frequency in Channel 1 by $15734/2$ MHz (7867Hz).

For Channel 1, then, sync tip FM frequency is 3.407867MHz and peak white becomes 4.407867MHz.

Channel 2 remains the same as before, sync tip is 3.4MHz, and peak white is 4.4MHz.

This displacement by 7.867kHz causes the beat produced by the overlapped horizontal sync to become an interleaving frequency, which solves the problem.

Recovery of this shifted FM signal, although somewhat different, is essentially the same as before.

The Chrominance and FM signals which are mixed and applied to the tape occupy a spectrum as shown in Fig. 30.

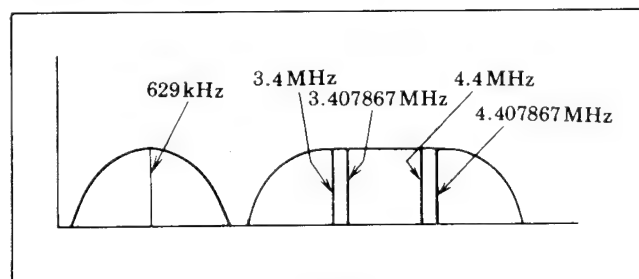


Fig. 30

SLP MODE

Like the SP Mode, the video track on the tape of an SLP recording is as shown below.

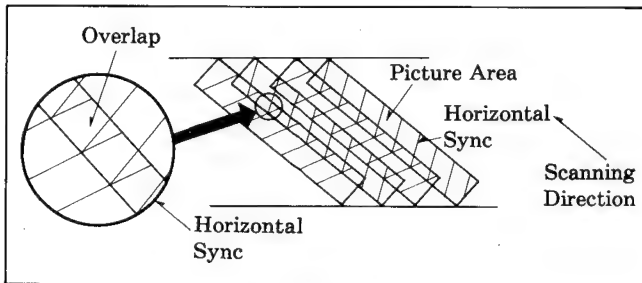


Fig. 31

Notice in Fig. 31 that the tracks do overlap, and that any track picture area of any track line up perfectly with the picture area of the adjacent tracks (Horizontal sync alignment). Let's pull several horizontal line segments off of the track for greater detail.

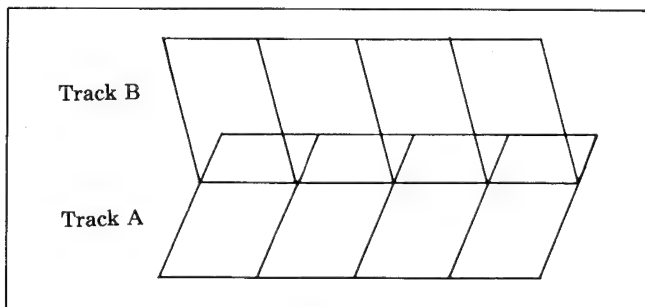


Fig. 32

As can be seen in Fig. 32, the horizontal sync portion of track B is in alignment with one of track A.

Assume that the SLP recorded tape is played back. When the A Head scans the A track, A Head picks up the B track signals on the overlapping region. Although the entire overlapping region will produce beats as LP mode.

This beat is eliminated by the FM Interleaving Recording. (Refer to LP Mode).

6. TAPE LOADING

In VHS, the tape path out of the cassette, across the stationary heads and around the video head cylinder forms a letter "M", thus the name "M" Loading. See Fig. 33.

The M loading has several advantages over previous, more complex loading formats.

- 1) Less tape is pulled out from the cassette. This reduces the chances of tape spillage and tangles.
- 2) Because the tape path in the M load pattern is short, loading time is only 3 seconds, including video muting.
- 3) FF and REW are performed INSIDE the cassette, further reducing the chances of tape damage.

7. SAFETY FEATURES

The M loading format incorporates many safety features to guard against accidental damage to the tape. If any of the mechanical failures listed below occurs, the recorder will go into the stop mode.

- 1) If loading takes longer than 5 seconds.
- 2) If take up fails to start after 3 seconds.
- 3) If take up fails during Record or Playback.
- 4) If the head cylinder fails to start.
- 5) If ANY belt breaks.
- 6) If the auto-stop lamp burns out.

The video tape in the cassette is worth protecting, so if any of these potentially dangerous failures occurs while the unit is recording or playing back, it will automatically stop.

It cannot be operated again until the problem is solved.

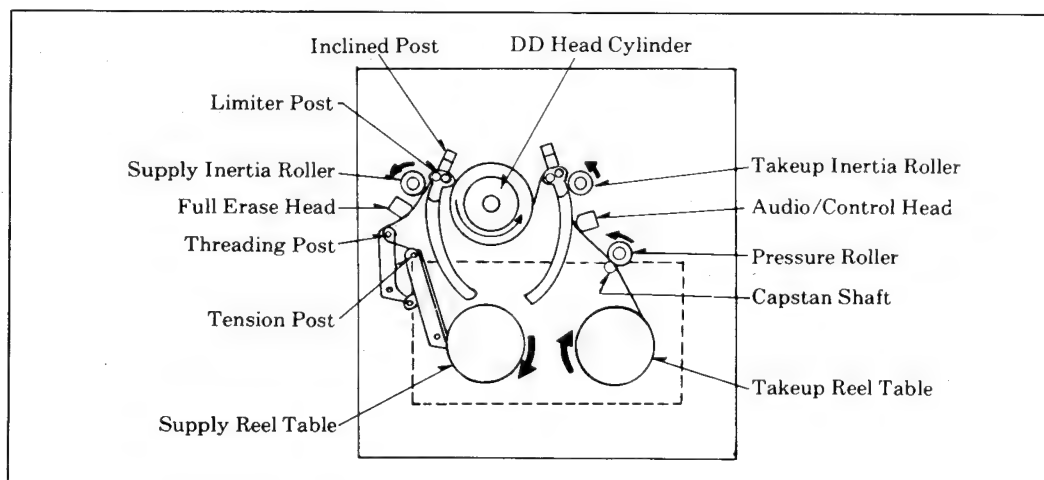


Fig. 33

GLOSSARY OF TERMS

ACC

Automatic Color Control used to maintain an overall constant color signal level in the color circuits.

ACK

Automatic Color Killer.

Adjacent Track

This is the name of the video track to the immediate left or right of the track of concern.

AFC

Automatic Frequency Control used to phase-lock the color circuits to either the recording or playback color signal, in order to achieve a stable color signal.

AFT

Automatic Fine Tuning...This is a special circuit found in most recent TV sets which makes the local oscillator of the TV tuner follow the channel of concern in order to produce a stable IF frequency. In other words, if for any reason the TV station being received changes frequency, the AFT circuit will automatically compensate so that no interference will be seen on the screen, i.e., no manual fine tuning is necessary.

AGC

Automatic Gain Control used to maintain an overall constant picture level in the luminance circuits.

APC

Automatic Phase Control used to help phase lock the color circuits to either the recording or playback color signal in order to achieve a stable color signal.

Azimuth

A term used to describe the left to right tilt of the gap of a recording head, if it could be viewed straight on.

Balanced Modulator

A circuit so designed to give as an output the frequency sum or frequency difference of its two input signals. Any special characteristics of one of the input signals will be present in the output signal.

Beats

A term used to describe the unwanted signals produced when two original signals are allowed to be mixed together.

Bipolar PG

Pulse Generator signals that have both positive and negative excursions.

Burst

A short time occurrence (8 to 10 cycles) of the 3.58 MHz subcarrier signal, appearing right after horizontal sync but centered on the blanking portion of the video waveform. Burst is used to keep the color oscillator of a TV receiver locked to the broadcast station.

B/W

Abbreviation for Black and White.

C

Capacitor.

C Signal

The color portion of a video signal.

Capstan

A small rotating metal dowel which drives the recording tape to assure positive tape movement.

Chroma

The color portion of a video signal.

Chrominance

The color portion of a video signal.

Clamp

The process of giving an AC signal a specific DC level.

Control Signal

A special signal recorded onto the video tape which is used during playback as a reference for the servo circuits.

Converted Subcarrier

This is the process of frequency shifting the color 3.58 MHz subcarrier and its sidebands down to 629 kHz.

Crosstalk

The name given to the unwanted signals obtained when a video head picks up information from an adjacent track.

D

Diode.

DL

Delay Line.

DDC

Direct Drive Cylinder...as used in VHS, this means that the video heads are driven by a self-contained brushless DC motor using no belts or gears. DD cylinders produce pictures with better stability.

Dark Clip

After emphasis, the negative going spikes (undershoot) of a video signal may be too large in amplitude for safe FM modulation. A dark clip circuit is used to cut off these spikes at an adjustable level.

Delta Factor (Δf)

A term used to indicate that a playback signal off the video tape has some jitter or "wow and flutter". Δf , or "a change in frequency" means that the color signal off the tape is not a stable frequency of 629 kHz, but rather a signal whose frequency at any instant is some small amount above or below 629 kHz.

Deviation

A term used to describe how far the FM carrier swings when it is modulated. In VHS the upper limit is 4.4 MHz.

Dew Detector

A variable resistor whose resistance value depends upon the ambient humidity.

Dihedral

A term used to describe the relative position between the two video heads as they are mounted in the head cylinder. Perfect dihedral means that the tips of the heads are exactly 180° apart.

Dropout

A momentary absence of FM or color signal off the tape, whether due to uneven oxide or a coating of dust on the tape or video heads.

Duty Cycle

In describing a rectangular waveform, the "duty" refers to the percentage of off time and on time for one complete cycle. 50—50 means that there are equal periods of off time and on time for one cycle and this would be a square wave.

E-E

Electronics to Electronics...this is the picture viewed on the TV set when a recording is being made. This picture goes through some but not all of the circuits of the recorder and is used to test the operation of said circuits.

EQ

Shortened form of "Equalization", used in the audio circuits.

Emphasis

The process of boosting the level of the high frequency portions of the video signal.

FG

Frequency Generator used in the servo circuits.

FL

Filter.

FM Signal

The luminance portion of the video signal is used to control the frequency of a stable multivibrator. The output of this multivibrator is a frequency modulated (FM) signal shifting from 3.4 MHz to 4.4 MHz (pulse sidebands).

Field

One half of a television picture. A field consists of 262.5 horizontal scanning lines across the picture tube. Two fields are necessary to complete a fully scanned TV picture (frame). First, one field is "sprayed" on the picture tube, starting at the top of the tube with Line 1, and ending at the bottom with Line 262.5. Then, the next field begins at the top of the tube again with Line 262.5 and ends at the bottom with Line 525. The lines of the second field lie in-between the lines of the first field. This property of falling in-between lines is called "interlacing". The two sweeps of the picture tube, or two fields make up one complete TV picture or "frame". Frame repetition is 30 Hz, therefore field repetition is 60 Hz.

Flagwaving

This is the term used to describe a TV set's ability to accept unstable playback pictures from a video tape recorder. All home VTR's have some degree of playback instability. A TV set with a long horizontal AFC time constant may not recover from the VTR's instability before the active picture is being scanned. This can cause a bending or flapping from side to side of the top inch or so of the screen. This movement is called "flagwaving".

Frame

One complete TV picture. See "Field".

Gate

A circuit which will deliver an output only when a specific combination of its inputs are present. For use in analog or digital applications.

Guard Band

This is the space between video tracks on the video tape in the SP mode. Guard bands contain no information.

HD

Horizontal Drive signal.

Head Cylinder

A cylindrical piece of metal which houses the video heads. The tips of the heads protrude slightly from the surface of the cylinder so that they may scan the tape as the cylinder spins.

Head Switching

The action of turning off during playback, the video head which is not in contact with the video tape. A particular video head will be turned off 30 times per second. This is done so that the head which is not scanning the tape, and therefore not delivering a good signal, cannot contribute any noise to the playback signal.

Head Switching Pulse

The signal which is applied to the Head Amplifier to perform head switching. This is a square wave at 30 Hz, with a 50—50 duty cycle.

Helical

A word used to describe a general type of VTR in which the tape wraps around the video head cylinder in the shape of a 3-dimensional spiral, or "helix". The video tracks are recorded as a series of slanted lines.

IC

Integrated Circuit.

Interchangeability

A term used to describe how well a particular VTR will play back a tape recorded on another VTR of the same type. Good interchangeability indicates good playback.

Interlacing

The property of the scan lines of two television fields to lie in-between each other. See "Field".

Interleaving

A term used to indicate that the harmonics of the chrominance signal lie in-between the harmonics of the luminance portion of the video signal as it is viewed on a spectrum analyzer. This means that the color information of a video signal does not interfere with, although it is broadcast at the same time as, the luminance information.

Also, signals which have this interleaving property are not readily seen on a TV screen, because of their virtual cancellation characteristics. See the section "General Introduction to VHS SP, LP and SLP Formats" page 4.

Interleaving signals (fi) must have the following frequency relationship:

$$f_i = \left(\frac{2n+1}{2} \right) \times f_H \quad (n=0, 1, 2, 3, 4, \dots)$$

$$f_H = 15,734 \text{ Hz (H sync frequency)}$$

Jitter

The name of the effect on the playback picture if a VTR has too much "wow and flutter". The picture appears to have a rapid shaking movement.

L

Coil.

Luminance

This is the portion of video signal which contains the sync and B/W information.

MMV

Monostable Multi-Vibrator...Usually an IC device which gives a logic high or low output with a variable duration upon receipt of an input pulse or transition.

Non-Linear Emphasis

This is similar to regular emphasis with the difference that small level high frequency portions of the signal are given more of a boost than higher level high frequency portions.

NTSC

The National Television Systems Committee. These four letters identify the United States color television standard.

PG

Pulse Generator used in the servo circuits.

Q

A term used to describe the graphic response of a filter or tuned amplifier.

R

Resistor.

RF

Radio Frequencies.

Rotary Chroma

The name of the process used in VHS to change the phase of the chrominance signal at a rate of 15,734 (same as H sync frequency) times per second.

Rotary Transformer

A device used to magnetically couple RF signals to and from the spinning video heads, thus eliminating the need for brushes.

Sample and Hold

A process used in comparator circuits by which the value of a particular signal is measured at a specific moment in time...then this value is stored for later use.

Servo

Short for Servomechanism. This is an electro-mechanical device whose mechanical operation (for instance motor speed) constantly being measured and regulated so that it closely matches or follows an external reference.

Skew

Another way of saying Tension Error. Skew is actually the change of size or shape of the video tracks on the tape from the time of recording to the time of playback. This can occur as a result of poor tension regulation by the VTR, or by ambient conditions which affect the tape.

Subcarrier

The name of the 3.58 MHz continuous wave signal used to carry color information.

T

Transformer.

TP

Test Point.

TR

Transistor.

Tension Error

See "Skew".

Time Base Stability

A term used to describe how closely the playback video signal from a VTR matches an external reference video signal...in regard to sync timing rather than picture content.

Tracking

This is the action of the spinning video heads during playback when they accurately track across the video RF information laid down during recording. Good tracking indicates that the heads are positioning themselves correctly, and are picking up a strong RF signal. Poor tracking indicates that the heads are off track, and picking up low level RF signal or noise.

VCO

Voltage Controlled Oscillator...An oscillator whose frequency of oscillation is governed by an external voltage.

Video Head

This is the electro-magnet used to develop magnetic flux which will put RF information on the tape. In VHS, two video heads are mounted in a rotating cylinder around which the video tape is wrapped. As the cylinder spins, each video head is allowed to alternately scan the tape.

Video Track

The name of the RF information laid down during recording, as a particular video head scans across the tape.

VHS

Video Home System.

VTR

Video Tape Recorder.

VV

Video to Video...or...the actual playback picture produced from a tape during playback.

VXO

Voltage Controlled Crystal Oscillator...Similar to VCO except that a quartz crystal is used as a reference which can be varied.

White Clip

After emphasis, the positive going spikes (overshoot) of the video signal may be too large for safe FM modulation. A white clip circuit is used to cut off these spikes at an adjustable level.

XTAL

Abbreviation for crystal.

Y Signal

The B/W portion of a video signal containing B/W information and sync.

Service Manual

Vol. 2

Troubleshooting Guide

Electrical Adjustment Procedures

Mechanical Adjustment Procedures

Portable Video Cassette Recorder

Panasonic **VHS**
 Omnivision IV
PV-2600


SPECIFICATIONS

Power Source:	Deck: DC 12V Tuner unit: 120V AC, 60Hz	Output Level:	Video: VIDEO OUT jack (RCA) 1.0Vp-p 75Ω unbalanced Audio: LINE OUT jack (RCA) -6dB, 1kΩ unbalanced Earphone Jack -20dB, 200Ω unbalanced RF Modulated: Channel 3 or 4 72dBμ (open voltage), 75Ω unbalanced
Power Consumption:	Deck: Approx. 12 watts (Playback mode) Tuner unit: Approx. 75 watts	Video Horizontal	Resolution: Color: more than 230 lines B/W: more than 270 lines
Television System:	EIA Standard (525 lines, 60 fields) NTSC color signal	Signal-to-Noise Ratio:	Video: SP mode: better than 40dB LP mode: better than 40dB SLP mode: better than 40dB (Rohde & Schwarz noise meter) Audio: SP mode: better than 42dB LP mode: better than 40dB SLP mode: better than 40dB
Video Recording	System: 2 rotary heads, helical scanning system Luminance: FM azimuth recording Color signal: converted subcarrier phase shift recording	Operation	Temperature: 41°F-104°F (5°C-40°C) Operating Humidity: 10%-75%
Audio Track:	1 track	Weight:	Deck: 18.3 lbs. (8.3kg) Tuner unit: 12.6 lbs. (5.7kg)
Tape Format:	Tape width 1/2 inch (12.7mm), high density tape	Dimensions:	Deck: 12-1/4"(W) × 14-3/8"(D) × 5-5/8"(H) 308(W) × 362(D) × 140(H)mm Tuner unit: 7-5/8"(W) × 14-1/8"(D) × 5-5/8"(H) 192(W) × 356(D) × 140(H)mm
Tape Speed:	SP/1-5/16 i.p.s. (33.35mm/s), LP/21/32 i.p.s. (16.67mm/s), SLP/7/16 i.p.s. (11.12mm/s)	Available Tapes:	1/2" VHS video cassette tapes NV-T120 Approx. 810ft. (257m), 2, 4 or 6 hrs. NV-T60 Approx. 417ft. (127m), 1, 2 or 3 hrs.
Record/Playback Time:	360 min. with NV-T120		
FF/REW Time:	Less than 4.5 min. with NV-T120		
Heads:	Video: 2 rotary heads Audio/Control: 1 stationary head Erase: 1 full track erase 1 audio track erase for audio dubbing		
Input Level:	Video: VIDEO IN jack (RCA) 1.0Vp-p, 75Ω unbalanced Audio: MIC IN jack -70dB, 600Ω -70dB, 600Ω unbalanced LINE IN jack (RCA) -20dB, 100kΩ unbalanced TV Tuners: VHF input Ch2~Ch13 75Ω unbalanced UHF input Ch14~Ch83 300Ω balanced		

Weight and dimensions shown are approximate. Specifications are subject to change without notice.

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MECHANICAL ADJUSTMENT PROCEDURES

1. DISASSEMBLY OF CABINET PARTS

1. DISASSEMBLY FLOWCHART

This flowchart indicates disassembly steps of the cabinet parts and the Bottom P.C. Board in order to find the item(s)

necessary for servicing. When reassembling, perform the step(s) in the reverse order.

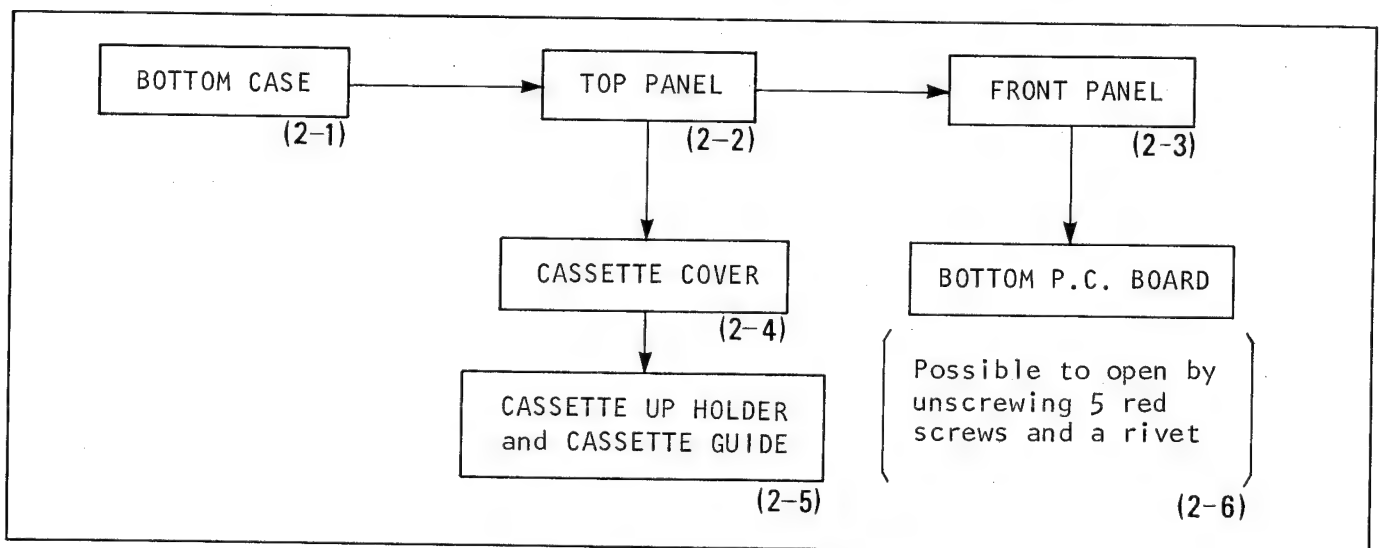


Fig.M1. Disassembly Flowchart

Note: Final adjustments are required when the Cassette Up Holder and the Cassette Guide (Cassette Compartment) are reassembled. Refer to the item "CASSETTE COMPARTMENT AND CASSETTE GUIDE" in Mechanical Adjustment Procedure section.

2. DETAILED DISASSEMBLY METHOD

2-1. Removal of the Bottom Case

1. Place the deck upside down so that the Bottom Case faces upward and remove the Battery Cover.
2. Unscrew 5 screws (A) and remove the Bottom Case. (Number 5 screw located in Battery Compartment).

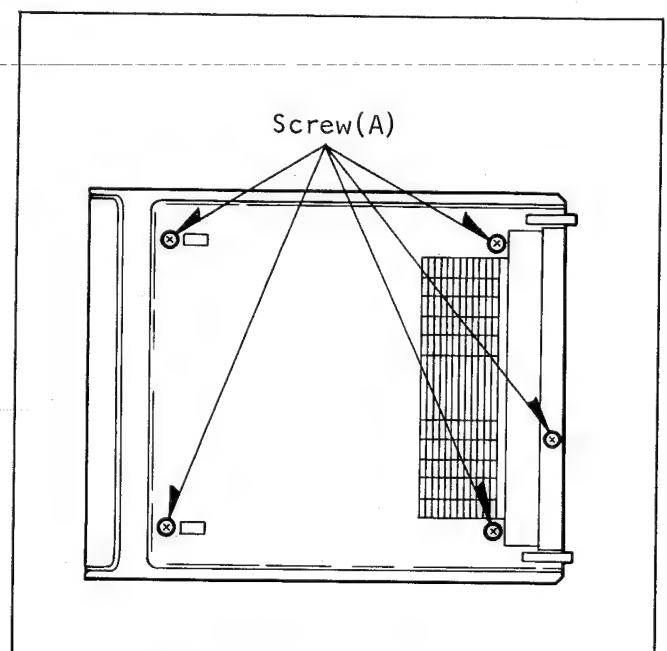


Fig.M2. Removal of Bottom Case

2-2. Removal of the Top Panel

1. Turn the deck over again so that the Top Panel faces upward.
2. Connect the power source, turn the power ON and press the Eject Button to raise the Cassette Compartment.
3. Unscrew 2 screws (B) and remove the Top Panel.

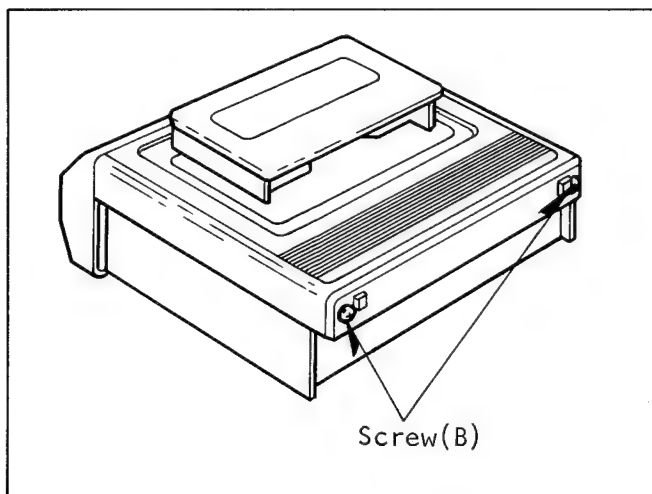


Fig.M3. Removal of Top Panel

Note: The Cassette Compartment must be raised when removing the Top Panel.

2-3. Removal of the Front Panel

Unscrew 4 red screws (C) on both sides and carefully remove the Front Panel with preventing it from being damaged on the locking portion.

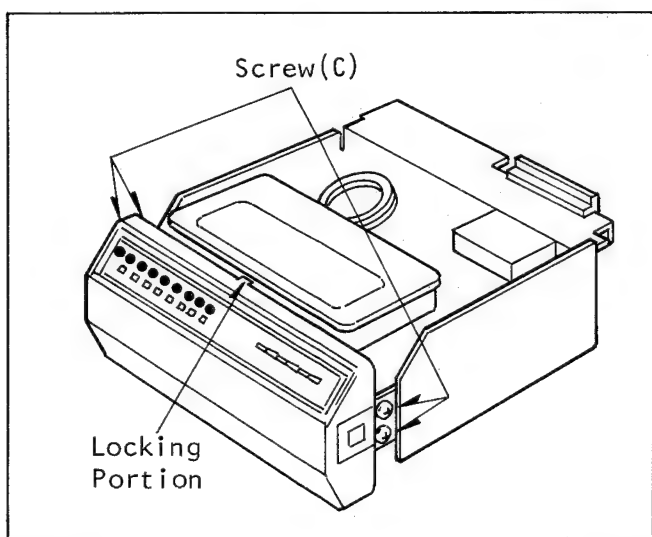


Fig.M4. Removal of Front Panel

2-4. Removal of the Cassette Cover

1. Connect the power source, turn the power ON and press the Eject Button to raise the Cassette Compartment. And disconnect the power.

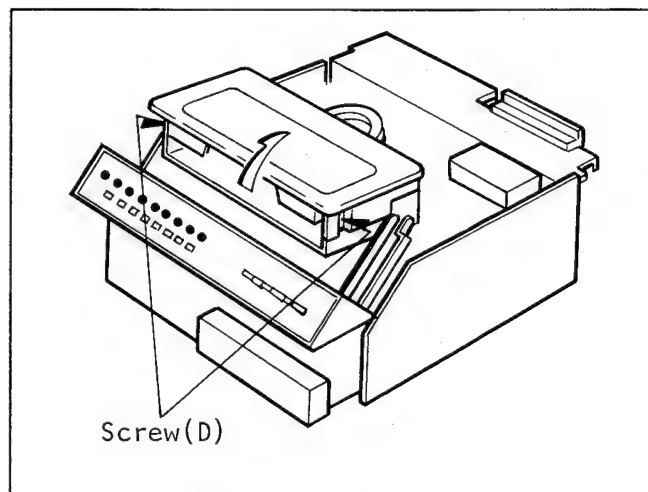


Fig.M5. Removal of Cassette Cover-(1)

2. Unscrew 2 screws (D), lift the front end of Cassette Cover by about 45 degrees and carefully remove the Cassette Cover by pushing it toward the direction indicated by the arrow.

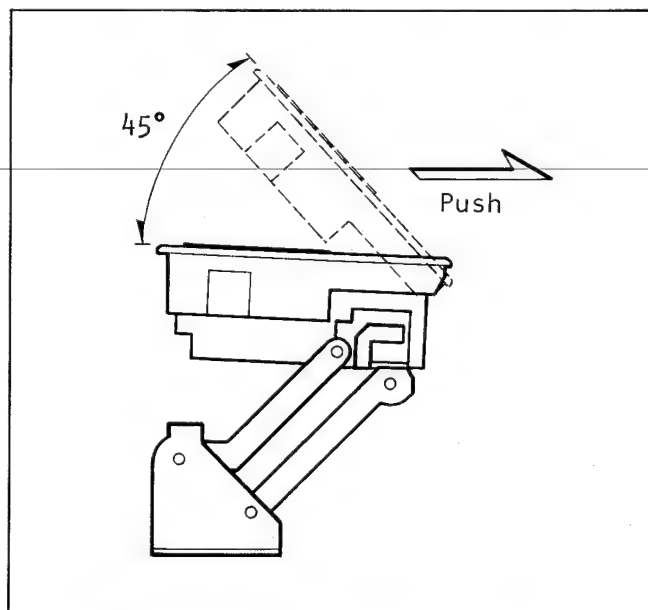


Fig.M6. Removal of Cassette Cover-(2)

Note: When reinstalling the Cassette Cover, be sure that the Cassette Holding Bar is located on the upper portion of the Stoppers.

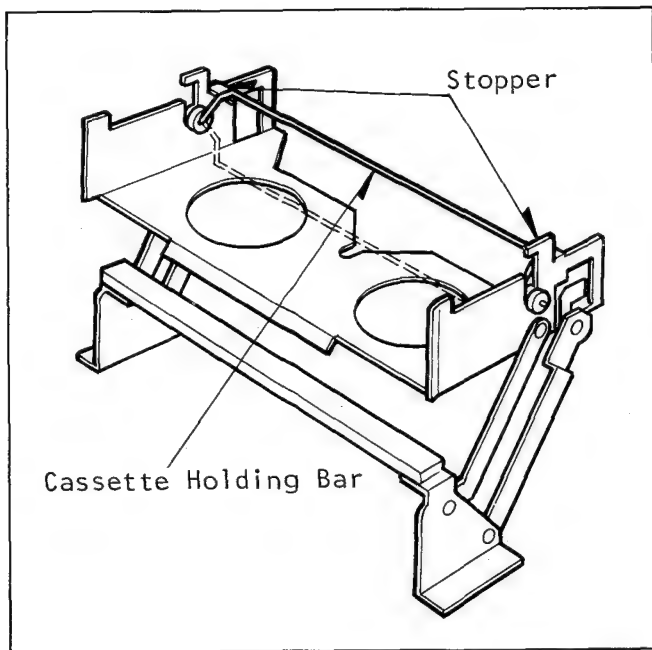


Fig.M7. Removal of Cassette Cover-(3)

2-5. Removal of the Cassette Compartment and Cassette Guide

1. Unscrew the 4 screws (E) and remove the Cassette Compartment.
2. If only the Cassette Guide needs servicing, unscrew the 2 screws (F) and remove the Cassette Guide.

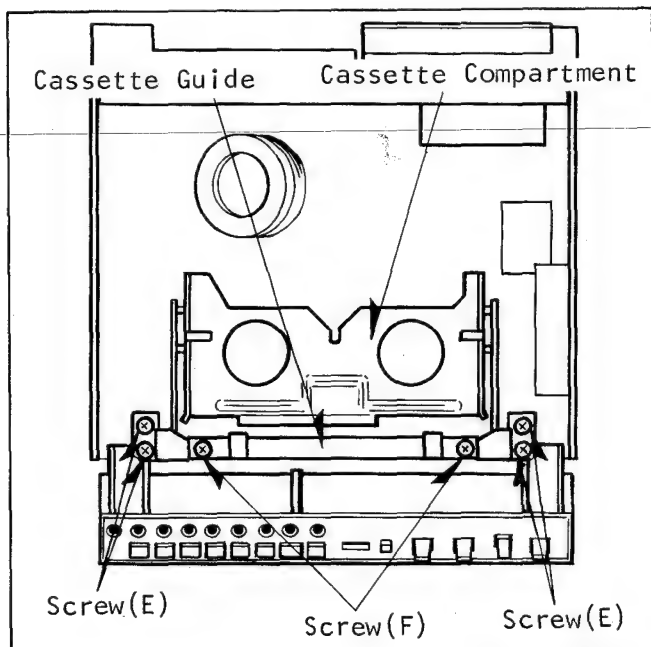


Fig.M8. Removal of Cassette Compartment

Note: Adjustments are required to replace the Compartment.
Refer to the item of "CASSETTE COMPARTMENT AND CASSETTE GUIDE" in Mechanical Adjustment Procedure section.

2-6. Opening of the Bottom Circuit Board

1. Place the deck vertically so that the left side (System Control P.C. Board) is facing down.
2. Unscrew the 5 screws (G), pull of the plastic rivet and open the Bottom P.C. Board.

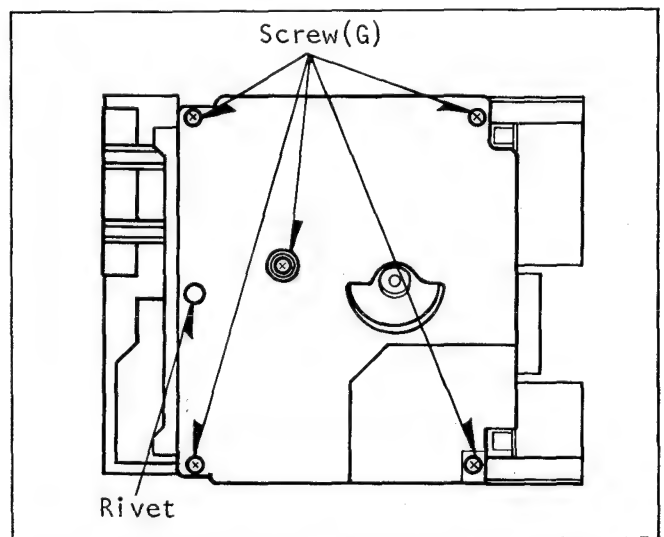


Fig.M9. Opening of Bottom P.C. Board

2. PERIODIC MAINTENANCE PROCEDURES OF TAPE TRANSPORT MECHANISM

1. PERIODIC MAINTENANCE CHART

Periodic maintenance (Cleaning and Lubricating) is necessary to insure continuous excellent performance of tape transport mechanism.

The tape transport mechanism is properly lubricated at the factory, therefore in normal use, and with average environmental conditions, additional lubrications would not be required for the first year of operation.

Depending on use and environmental conditions, periodic lubrication may be required. Also when parts replacements are necessary, new parts should be lubricated. When relubricating, remove the former lubricant first, then sparingly apply new lubricant because excessive lubricant may be transferred to other parts and cause malfunction.

PERIODIC MECHANICAL MAINTENANCE CHART						
DESCRIPTION	OPERATION TIME (HOURS)					
	500	1000	1500	2000	3000	5000
UPPER CYLINDER UNIT	C	R	C	R	R	R
SUPPLY INERTIA ROLLER TAKEUP INERTIA ROLLER CAPSTAN SHAFT UNIT PRESSURE ROLLER UNIT	C	C,O	C	C,O	C,O	C,O
LOADING GEAR UNIT LOADING BASE		G		G	G	G
REWIND LEVER UNIT PLAY ARM UNIT LOADING ARM UNIT		O		O	O	O
SUPPLY REEL TABLE TAKEUP REEL TABLE	C	C,O	C	C,O	C,O	C,O
PLAY BELT IDLER PULLEY BELT CAPSTAN BELT LOADING MOTOR BELT UNLOADING BELT PLAY IDLER UNIT PLAY PULLEY UNIT	C	C	C	R	C	C
COUNTER BELT A COUNTER BELT B FF IDLER UNIT REWIND ROLLER UNIT	C	C	C	C	R	C
ALL PULLEYS OTHER MECHANICAL PARTS CONCERNED TAPE TRANSPORTATION*	C	C	C	C	C	C
TENSION BAND UNIT FF BRAKE UNIT REELBRAKE UNIT				R		
CAPSTAN MOTOR					R	
*Tension Arm Unit, Loading Post-R, Loading Post-L, Threading Post, Audio Control Head, Full Erase Head and Post Sleeves. Note: C..... Cleaning. G..... Lubrication (Morlyton Grease) R..... Replacement O..... Lubrication (Spindle Oil)						

Fig.M10. Periodic Mechanical Maintenance Chart

2. DETAILED MAINTENANCE PROCEDURES

2-1. Cleaning of Upper Cylinder Unit

1. Position the video head to permit access for cleaning and hold the upper cylinder to keep it from turning while cleaning.
2. Gently rub the video head in direction of tape travel with Head Cleaning Stick (VFK27) moistened with freon solvent.
3. Repeat for the other video head.

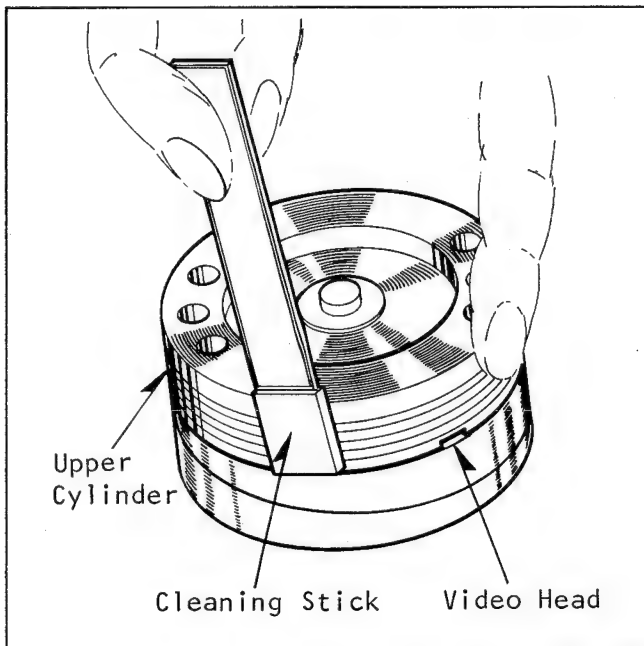


Fig.M11. Head Cleaning

- Notes: 1. Do not rub vertically.
2. Do not apply any pressure to head.
If contaminant is not easily removed, continued gentle wiping will usually remove the substance.

2-2. Cleaning and Lubrication of Supply/Takeup Inertia Roller

Gently rub the surface of rollers with soft cloth moistened with freon solvent.

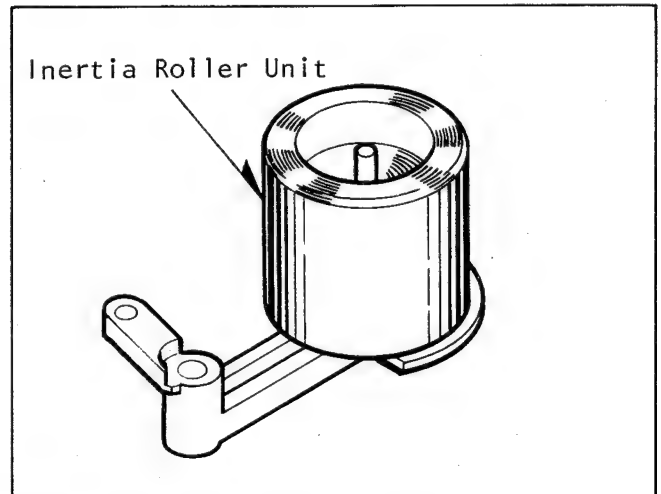


Fig.M12. Inertia Roller Unit

2-3. Cleaning and Lubrication of Capstan Shaft Unit

1. Gently wipe part (A) of the Capstan Shaft Unit with soft cloth moistened with freon solvent.
2. Sparingly apply spindle oil to the Oil Pool after the Capstan Shaft Unit is re-installed.

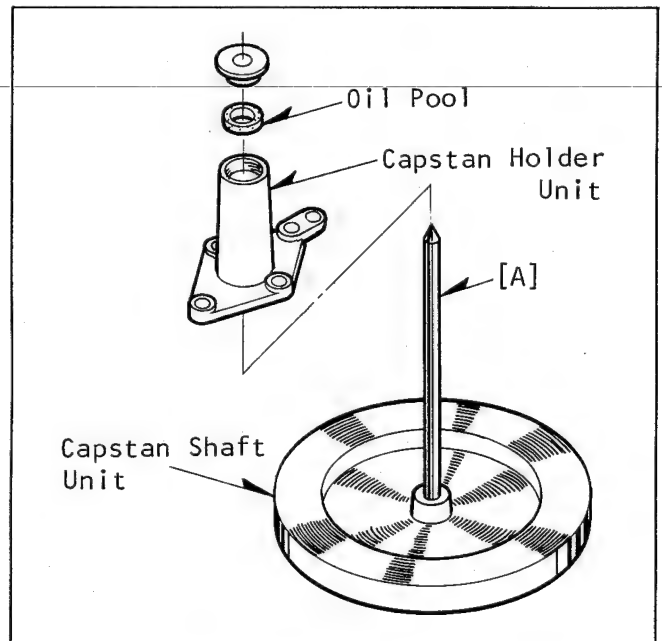


Fig.M13. Capstan Shaft Unit

2-4. Cleaning and Lubrication of Pressure Roller Unit

1. Gently rub Pressure Roller with cloth moistened with freon solvent.
2. Sparingly apply spindle oil to part (A) of the Pressure Roller Unit.

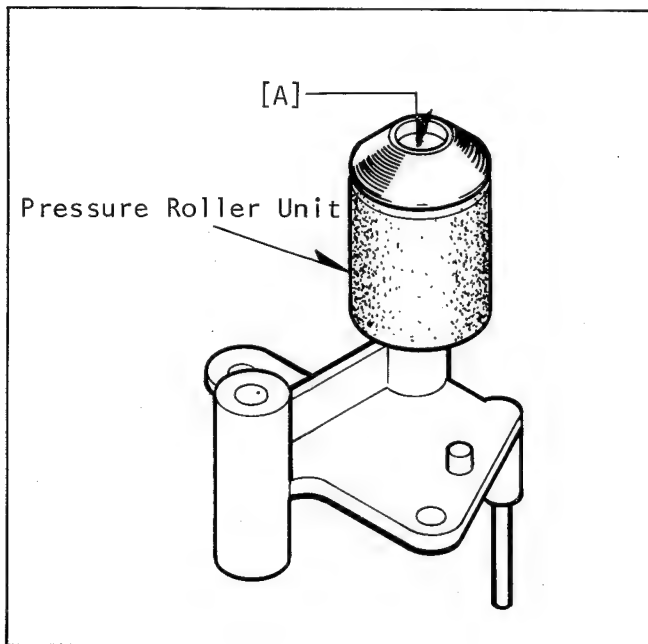


Fig.M14. Pressure Roller Unit

2-5. Lubrication of Loading Gear Unit
Sparingly apply Morlytone Grease (MOR265) to part (A) of Gears and the Worm Shaft.

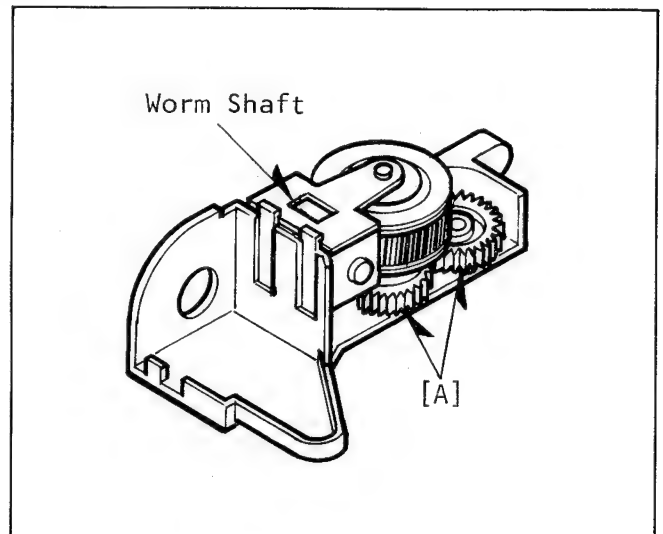


Fig.M15. Loading Gear Unit

2-6. Lubrication of Loading Base
Sparingly apply Morlytone Grease (MOR265) to part (A) of Loading Base.

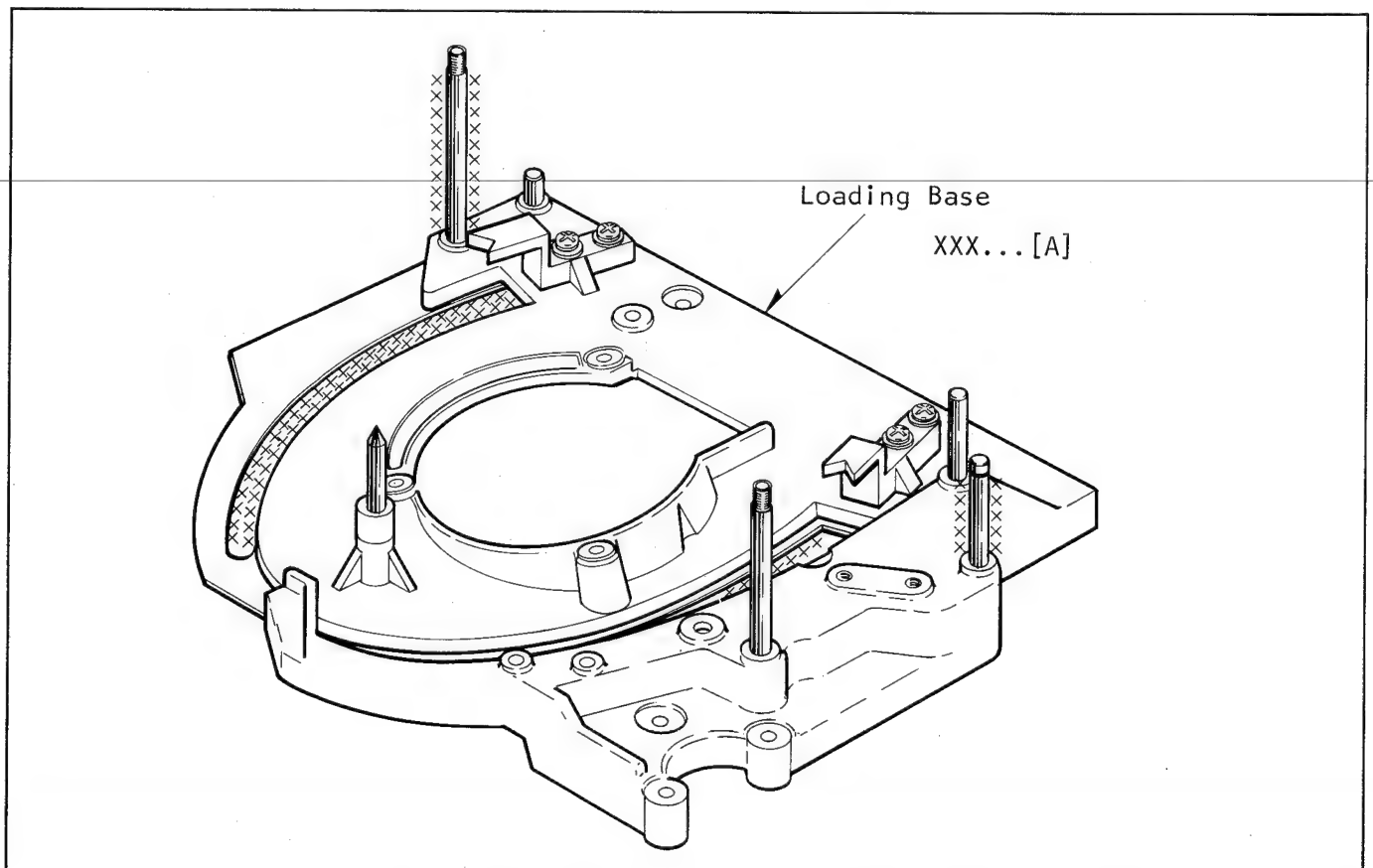


Fig.M16. Loading Base

2-7. Lubrication of Rewind Lever/
Play Arm/Loading Arm Units
Sparingly apply spindle oil to part
(A) of these parts and the Pulley Shafts.

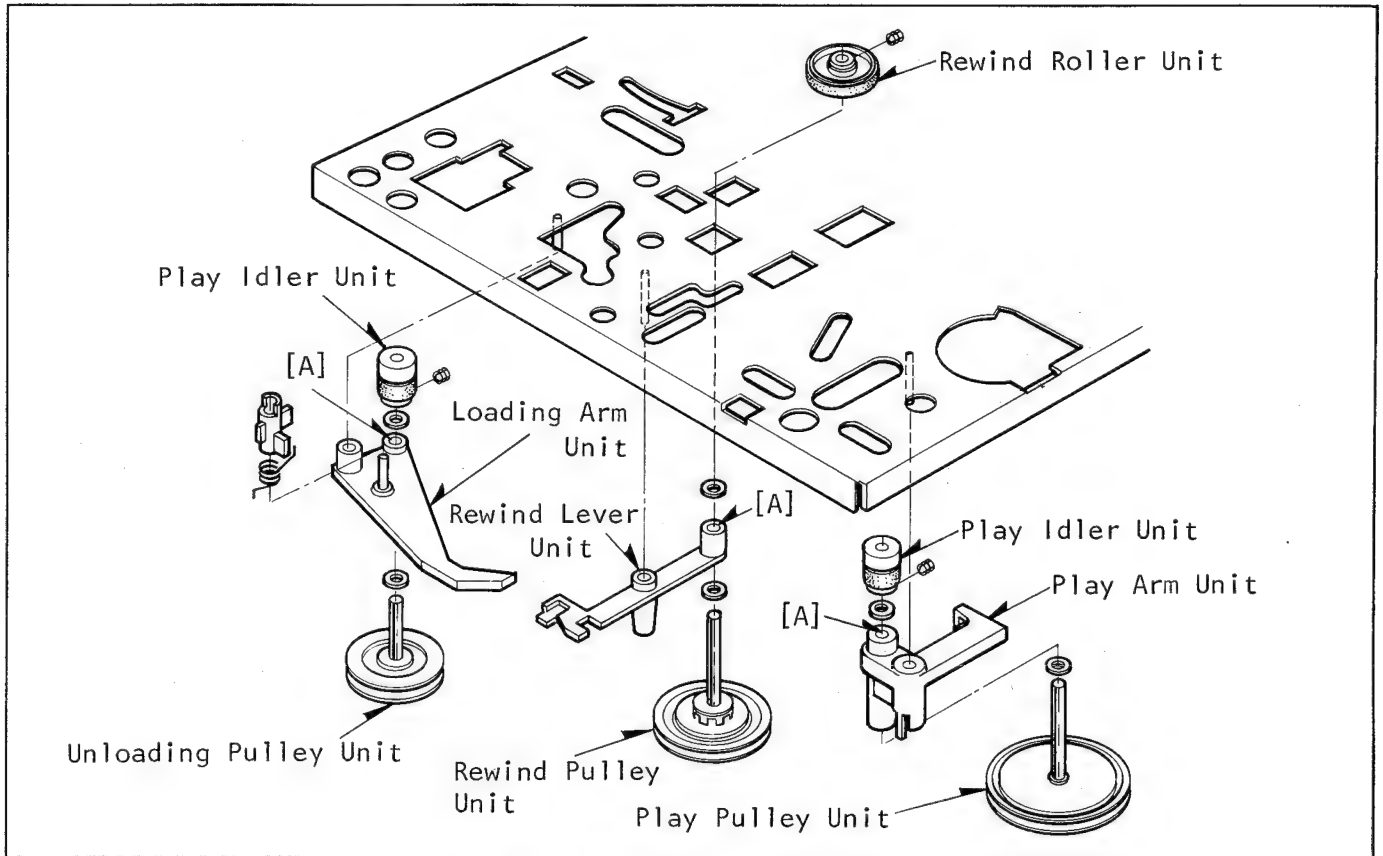


Fig.M17. Arms and Pulley Units

- 2-8. Cleaning and Lubrication of
Reel Tables
1. Gently wipe part (A) of both Reel
Tables with soft cloth moistened
with freon solvent.
 2. Sparingly apply spindle oil to
part (B) of both Reel Tables and
each shaft.

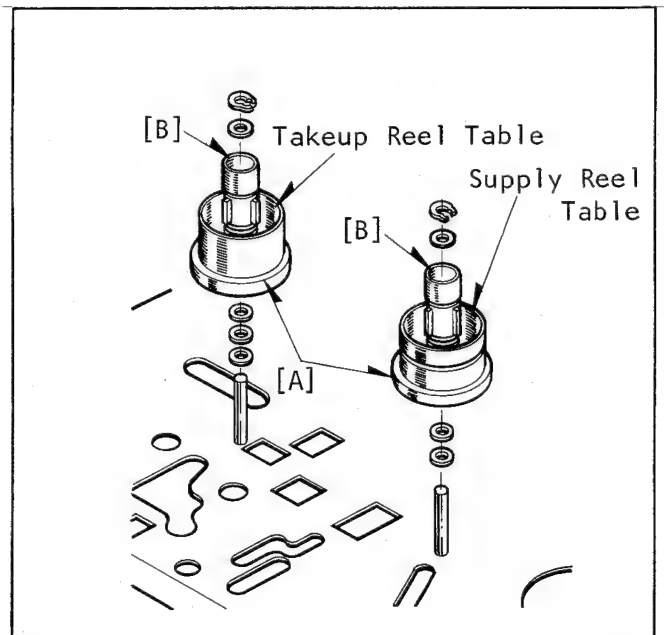


Fig.M18. Reel Table Units

2-9. Cleaning of Belts and Pulleys
Gently rub Loading Motor Belt (B-1), Unloading Belt (B-2), Idler Pulley Belt (B-3), Capstan Belt (B-4), Play Belt (B-5), Counter Belt A (B-6), Counter Belt B (B-7), Loading Motor Pulley (P-1), Loading Gear Pulley (P-2), Unloading Pulley (P-3), Capstan Motor Pulley (P-4), F.G. Pulley (P-5), Play Pulley Unit (P-6), Rewind Pulley (P-7) and the Connecting Pulley (P-8) with soft cloth moistened with freon solvent.

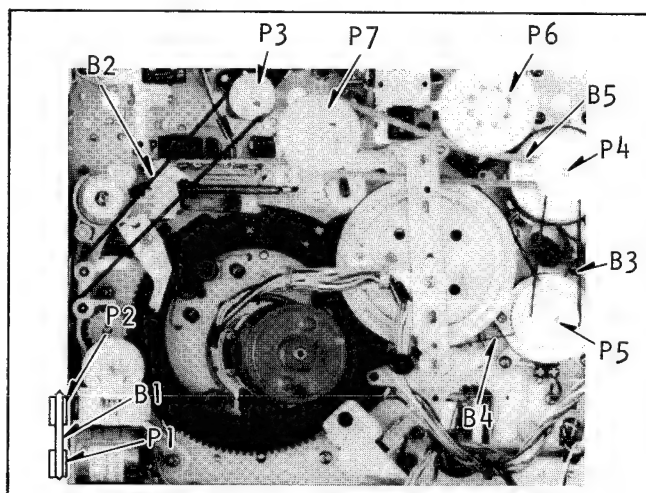


Fig.M19. Pulleys and Belts-(1)

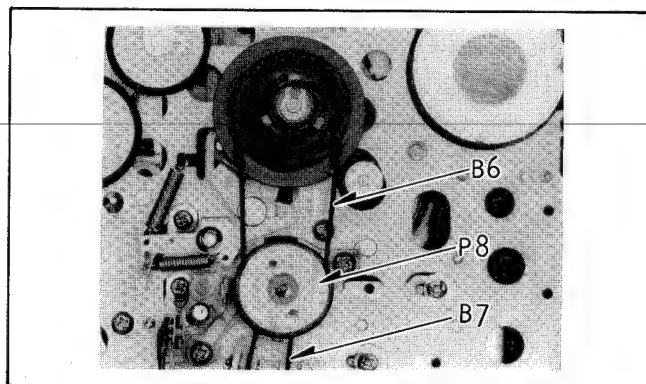


Fig.M20. Pulleys and Belts-(2)

2-10. Cleaning of Play Idler/F.F. Idler/
Rewind Roller Units

Gently rub Play Idler Unit, F.F. Idler Unit and the Rewind Roller Unit with soft cloth moistened with freon solvent. (See Fig. M17 for Play Idler Unit and Rewind Roller Unit).

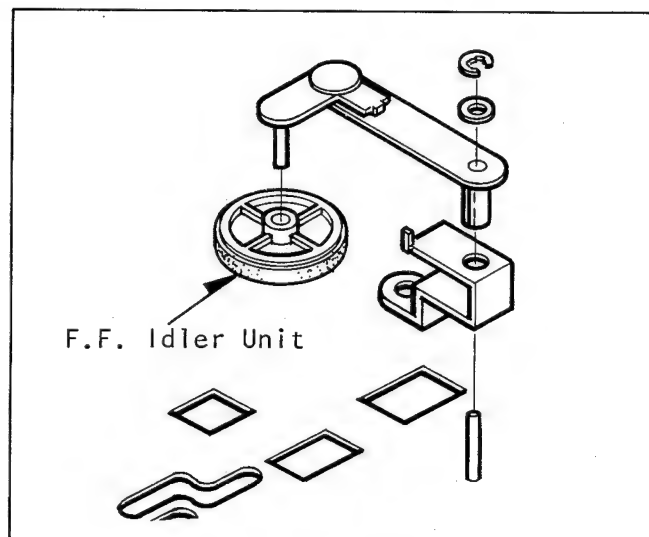


Fig.M21. F.F. Idler Unit

2-11. Cleaning of Other Mechanical
Parts in Tape Transport

Gently rub Tension Arm Unit, Loading Posts, Threading Post, Full Erase Head, Audio Control Head, and the Post Sleeve with soft cloth moistened with freon solvent.

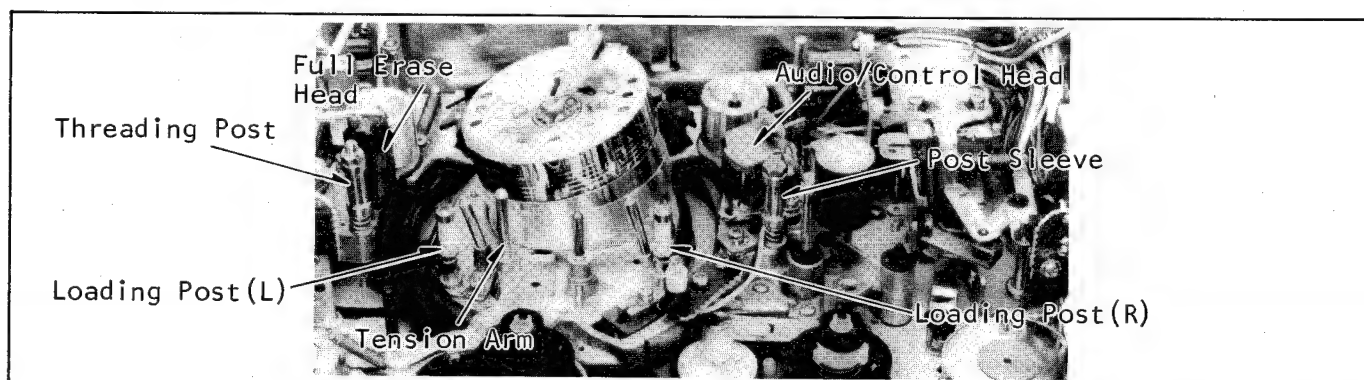


Fig.M22. Parts Concerned with Tape Transport

2-12. Replacement of Other Mechanical Parts

Refer to the sections of REPLACEMENT AND ADJUSTMENT PROCEDURES OF MAJOR PARTS when the parts marked "R" on the chart are requiring maintenance.

2-13. Lubrication of Other Mechanical Parts

The other mechanical parts which are not listed on the chart should receive recommended maintenance when necessary. Refer to marks of X X X or O O O on the Mechanical Exploded Views.

Note: X X X Apply Morlytone Grease

O O O Apply Spindle Oil

3. ADJUSTMENT PROCEDURES AND REPLACEMENT PROCEDURES OF MAJOR PARTS

1. REPLACEMENT AND ADJUSTMENT OF UPPER CYLINDER UNIT

1. Remove the Bottom Case and the Top Panel. (Refer to the section of "DISASSEMBLY METHOD", Items 2-1 and 2-2).
2. Connect the power, turn switch ON and push the Eject Button to raise the Cassette Compartment, to keep it from touching the video heads.
3. Unscrew the screw (A), remove the Discharge Brush Unit and unsolder the 4 lead wires of the video heads from the head relay board.
4. Unscrew the 2 screws (B) and remove the Upper Cylinder Unit by pulling it up very carefully.
5. Clean the fringe, bottom and rotative surface of the new Upper Cylinder Unit with a soft cloth moistened with alcohol or freon liquid.
6. Place the new Upper Cylinder Unit on the head disc base so that the screw holes match, and then tighten the 2 screws (B).
7. Solder the 4 lead wires to the head relay board. And reinstall the Discharge Brush Unit. (Observe wire color coding.)
8. Reinstall the Bottom Case and the Top Panel.

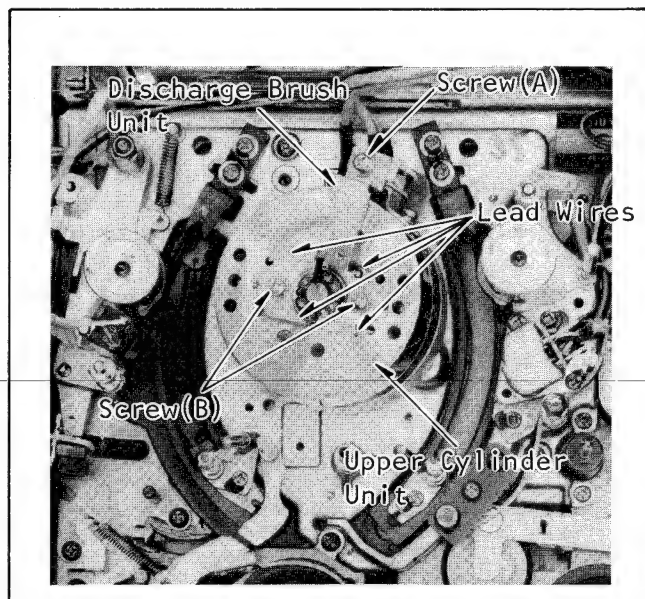


Fig.M23. Replacement of Upper Cylinder Unit

Note: When the replacement is completed, the Horizontal Position Adjustment of Audio/Control Head must be performed. Refer to "TAPE INTERCHANGEABILITY ADJUSTMENT" section.

2. REPLACEMENT AND CONFIRMATION OF DD CYLINDER UNIT

A. Replacement Procedure

1. Remove the Bottom Case, Top Panel, Front Panel and the Cassette Cover. And open the Bottom P.C. Board. (Refer to the section of 'DISASSEMBLY METHOD', Items 2-1, 2-2, 2-3, 2-4 and 2-6).
2. Unscrew the 4 red screws (A) on the Servo P.C. Board and disconnect connector (P-204). Disconnect the connector (P-57) on Pre-Amp Board and Dew Sensor Connector (P-615) on the System Control Board, then remove the lead wires from the clampers.

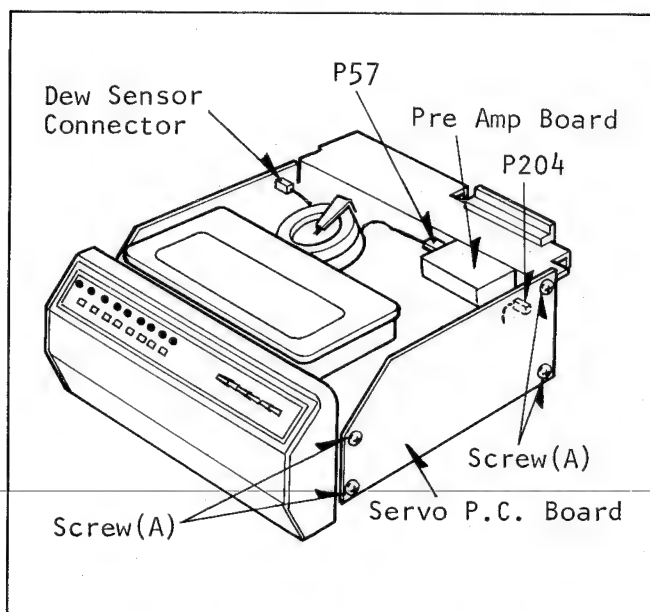


Fig.M24. Replacement of D.D. Cylinder-(1)

3. Unscrew the 3 screws (B) securing the DD Cylinder Unit and remove it from the Cylinder Base.

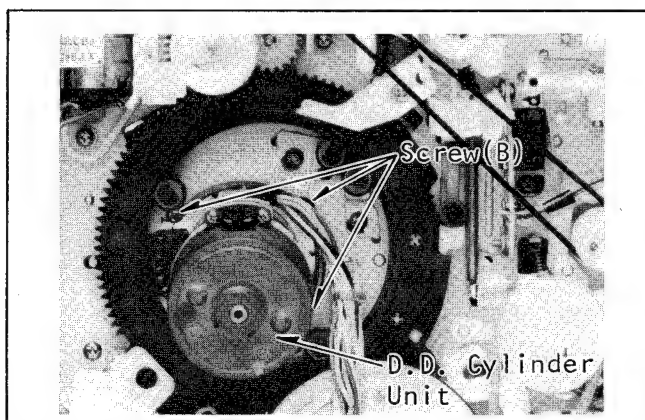


Fig.M25. Replacement of D.D. Cylinder-(2)

4. Remove the Upper Cylinder Unit from the DD Cylinder Unit which you have just removed from the chassis. (Refer to section 'REPLACEMENT OF UPPER CYLINDER UNIT').
5. Clean the fringe, bottom and rotative surface of the Upper Cylinder Unit and the new DD Cylinder Unit with a soft cloth moistened with alcohol or freon liquid.
6. Mount the Upper Cylinder to the new DD Cylinder Unit.
7. Reinstall the DD Cylinder Unit by reversing steps 3, 2 and 1 to complete the replacement.

B. Confirmation Procedure

When the DD Cylinder is replaced, the tape interchangeability should be checked. (Refer to the section of 'TAPE INTERCHANGEABILITY ADJUSTMENT' for details.

3. REPLACEMENT OF ERASE HEAD/ADJUSTMENT OF ERASE HEAD ARM

A. Replacement Procedure

1. Remove the Bottom Case, Top Panel and the Cassette Cover. (Refer to the section of 'DISASSEMBLY METHOD', Items 2-1, 2-2 and 2-4).
2. Unsolder the 2 lead wires from the top of the Erase Head and remove one end of the Spring as shown.
3. Unscrew the Adjust Nut, Washer and remove the Erase Head Arm.
4. Unscrew the 2 screws (A) and remove the Erase Head.
5. Install a new Erase Head and reverse the above steps and the adjustment procedure to complete the replacement.
6. Perform the adjustment procedure.

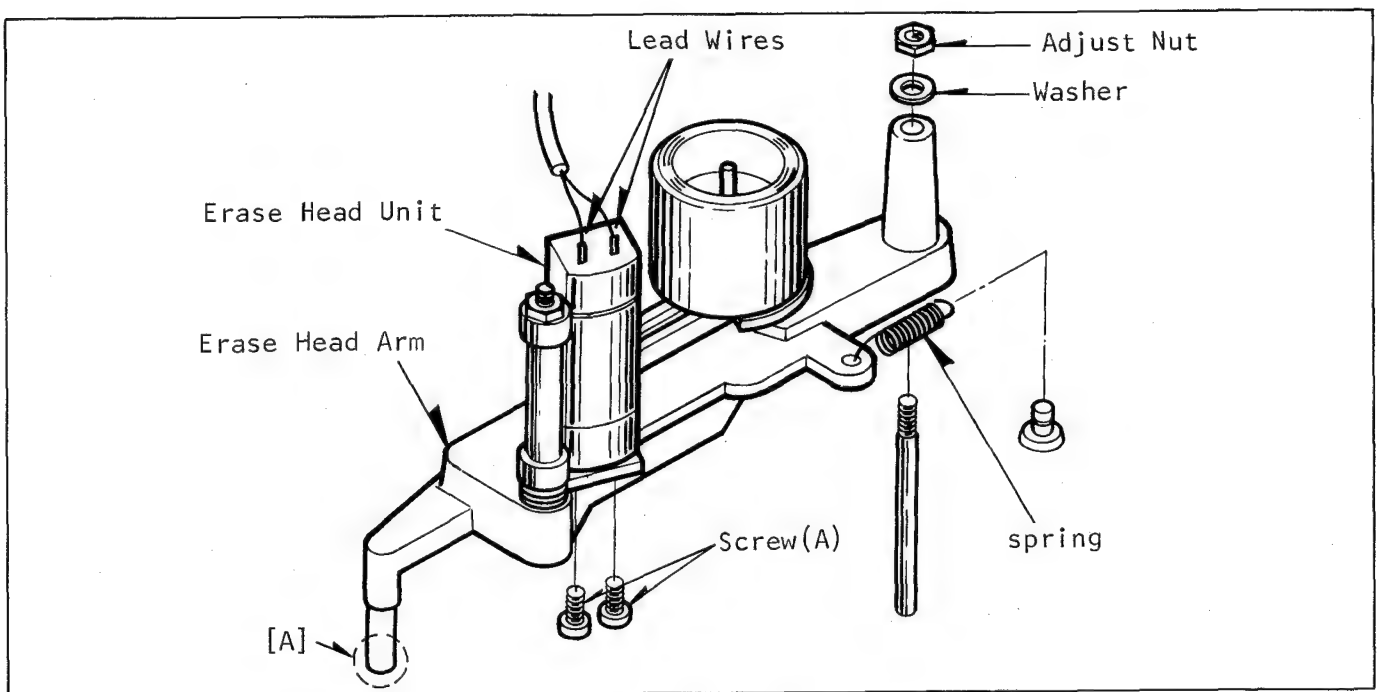


Fig.M26. Erase Head Arm

Note: When reinstalling the Erase Head Arm make sure that part (A) sets into the Release Lever Unit.

B. Adjustment Procedure

* Equipment Required:
Nut Driver

1. Install a new Erase Head and reverse the steps 4, 3 and 2 of the Replacement Procedure.
2. Connect the power source and turn the power switch ON.
3. Blind the Supply Photo Transistor with your finger and push the Play Button for loading. And as soon as loading is completed disconnect the power source.
4. Adjust the height of the Erase Head Arm so that the Loading Base fits on the V-shaped groove correctly by turning the Adjust Nut as shown in the Fig. M26.

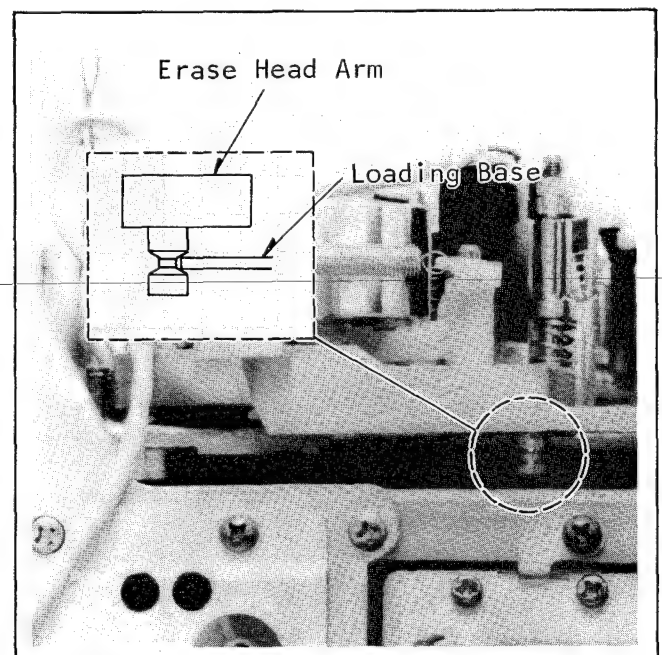


Fig.M27. Adjust ment of Erase Head Arm

Notes:

1. The surface of Post Sleeve, Erase Head and Takeup Inertia Roller which are in contact with tape should be free from scratches, oil and fingerprints.
2. Upon completion of adjustment, confirm that the tape passes the Erase Head correctly.

4. REPLACEMENT AND ADJUSTMENT OF AUDIO/CONTROL HEAD

A. Replacement Procedure

*** Equipment Required:**

Retaining Ring Remover, 4mm
..... (VFK0145)

1. Remove the Bottom Case, Top Panel and the Cassette Cover.
(Refer to the section of "DIS-ASSEMBLY METHOD", Items 2-1, 2-2 and 2-4)
2. Unsolder the 6 lead wires, unscrew the 2 screws (A) and remove the A/C Head Base Unit.
3. Install a new A/C Head Base Unit and reverse the above steps.
4. Perform the adjustment procedure.

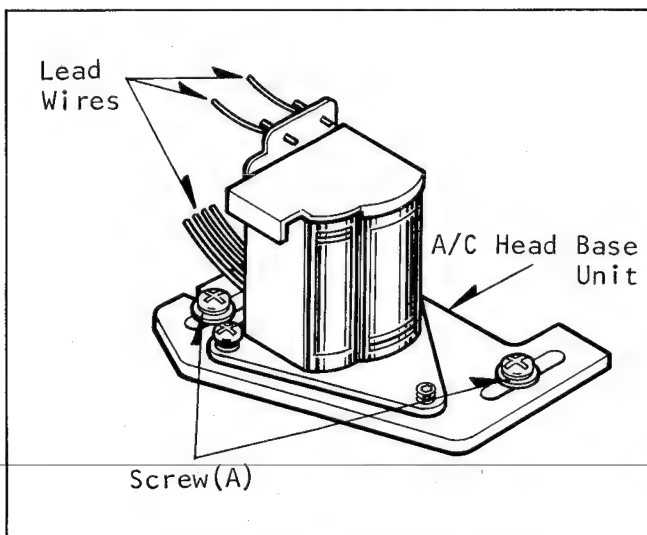


Fig.M28. Audio/Control Head

B. Adjustment Procedure

When the Audio/Control Head is replaced, the tape interchangeability should be checked. Confirm the items of height and tilt adjustment and make the fine adjustments if necessary. (Refer to the section of "TAPE INTERCHANGEABILITY ADJUSTMENT" for details).

5. REPLACEMENT OF TENSION ARM AND TENSION BAND/POSITION ADJUSTMENT OF TENSION POST

A. Replacement Procedure

1. Remove the Bottom Case, Top Panel and the Cassette Compartment.
(Refer to the section of "DISASSEMBLY METHOD", Items 2-1, 2-2 and 2-5).
2. Unscrew the screw (A), remove the Retaining Ring, Washer and Tension Arm Spring. And then remove the Tension Arm Unit.
3. Unscrew the screw (B) and remove the Tension Band Unit.
4. Install the new part(s) and reverse the above steps.

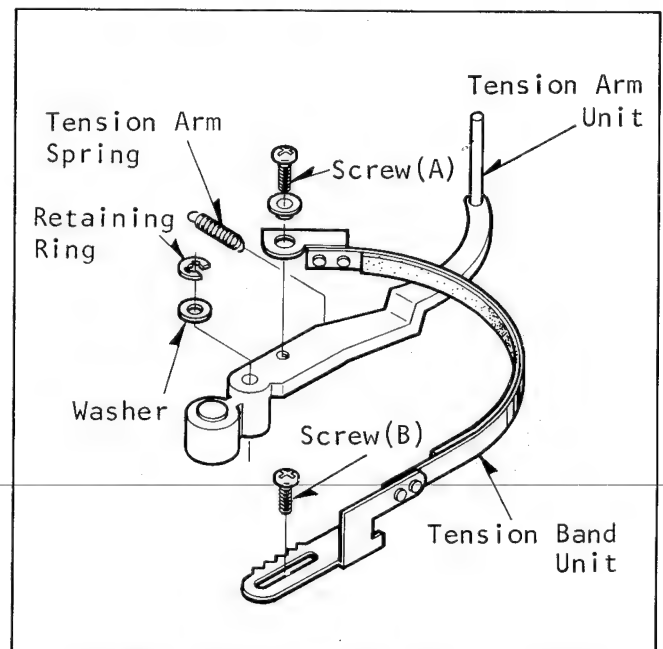


Fig.M29. Tension Arm/ Tension Band

Notes:

1. When the Tension Post is replaced, "POSITION ADJUSTMENT OF TENSION POST" and "ADJUSTMENT OF CASSETTE COMPARTMENT" should be checked. (Refer to each procedure for details).
2. When the Tension Band is replaced, "MEASUREMENT OF BACK TENSION" and "ADJUSTMENT OF CASSETTE COMPARTMENT" should be checked. (Refer to each procedure for details).

B. Adjustment Procedure (Tension Post)

* Equipment Required:

Ruler

Fine Adjustment Screwdriver (VFK0136)

* Specification

59.8 ~ 60.8 mm

1. Install a new Tension Arm Unit.
2. Connect the power source and turn the power switch ON.
3. Blind the Supply Photo Transistor with your finger and push the Play Button for loading. When Loading is completed, disconnect the power. (Keep power switch in ON position).
4. Measure the length between the center of Tension Post and that of Cassette Support Post.

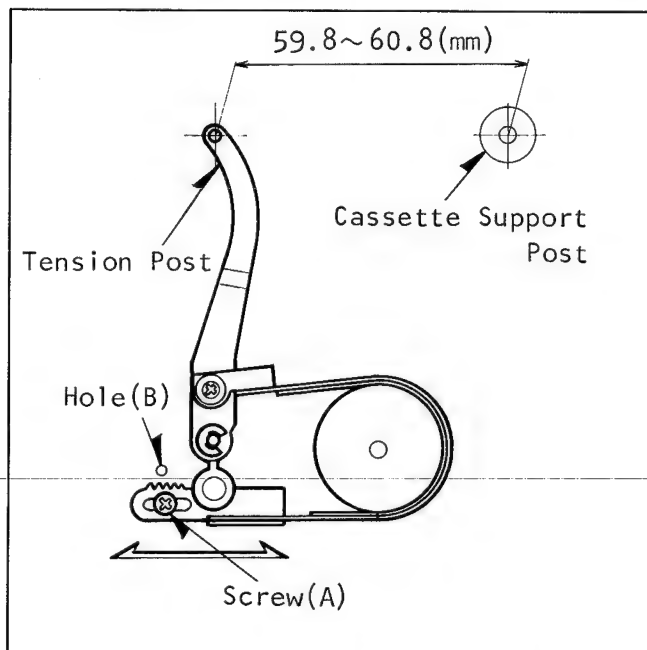


Fig.M30. Adjustment of Tension Post

5. If the length is out of the specification, loosen the screw (A), set the Fine Adjustment Screwdriver into Hole (B) and adjust the position of the Tension Band by displacing it in the directions indicated to obtain the specified length.
6. Then tighten screw (A) and connect the power source to place the deck in STOP mode.

6. ADJUSTMENT AND MEASUREMENT OF BACK TENSION

A. Measurement Procedure

* Equipment Required:

Back Tension Meter (Tentelometer mode in U.S.A. Model)

VHS Cassette Tape (120 Minutes Tape, NV-T120)

* Specification: 20 ~ 25 grams

1. Remove the Bottom Case and the Top Panel. (Refer to the section of "DISASSEMBLY METHOD", Items 2-1 and 2-2).
2. Playback the cassette tape from its beginning, pull the Supply Inertia Roller in the direction indicated by the arrow and hold it by adhesive tape after tape travel has stabilized.
3. Set a tension meter in front of the Supply Inertia Roller and take the reading.

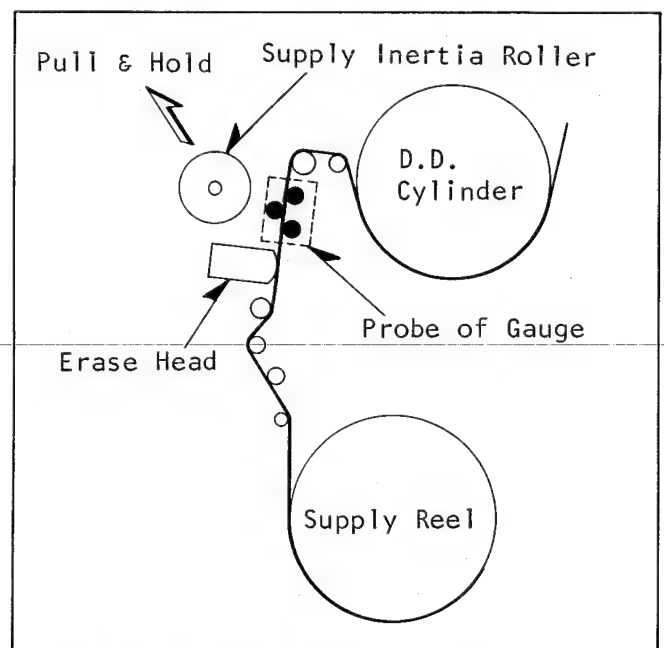


Fig.M31. Measurement of Back Tension

Notes:

1. This measurement should be performed at the beginning portion of 120 minutes tape.
2. When measuring, make sure that the three probes of the meter are all in good contact with the tape, but out of contact with Supply Inertia Roller.
3. It is recommended to be measured three times because the tension meter is very sensitive.

B. Adjustment Procedure

* Equipment Required:
Fine Adjustment Screwdriver
(VFK0136)

1. Loosen the screw (A) and set the fine adjustment screw driver into the hole (B).
2. Move the Back Tension Arm in either direction indicated by the arrow to obtain the specified tension. Turn the driver clockwise to raise tension, counter-clockwise to lower tension.
3. Slowly tighten screw (A) and remove the adhesive tape. Verify tension with the meter once again.

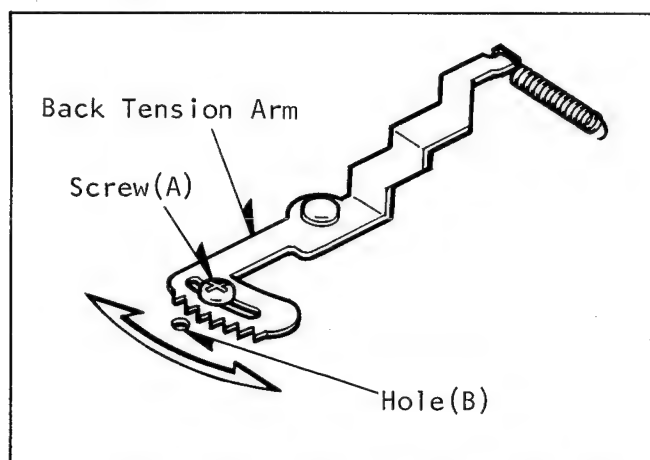


Fig.M32. Adjustment of Back Tension

7. REPLACEMENT OF TAKEUP/SUPPLY INERTIA ROLLER Replacement Procedure

* Equipment Required:
Retaining Ring Remover, 4mm
..... (VFK0145)

1. Remove the Bottom Case, Top Panel and the Cassette Cover. (Refer to the section of "DISASSEMBLY METHOD", Items 2-1, 2-2 and 2-4).
2. Remove the Inertia Arm Spring from Erase Head Arm (for Supply Inertia Roller) or from the Spring Hook (for Takeup Inertia Roller).
3. Remove Retaining Ring and remove the Inertia Roller Unit.
4. Install a new roller and reverse the above steps to complete the installation.

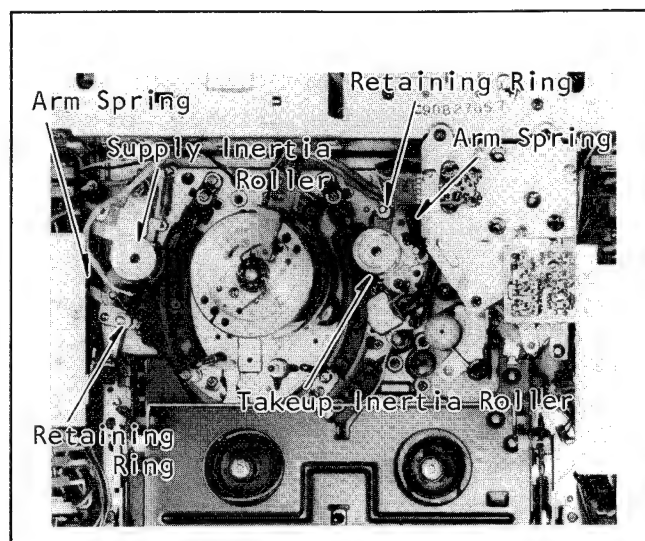


Fig.M33. Inertia Rollers

Note: The surface of rollers must be free from scratches, oil, grease and fingerprints.

8. REPLACEMENT OF PRESSURE ROLLER SOLENOID/ADJUSTMENT OF SPRING HOOK LEVER AND PRESSURE FORCE

A. Replacement Procedure

1. Remove the Bottom Case, Top Panel and the Cassette Compartment. (Refer to the section of "DISASSEMBLY METHOD", Items 2-1, 2-2 and 2-5).
2. Disconnect the connector P-57, unscrew the 3 screws (A) and remove the Head Amp Board. Then disconnect the connector P-56 connected with bottom of the Head Amp Board.
3. Unscrew the 4 screws (B) on the Servo Board and lower it.

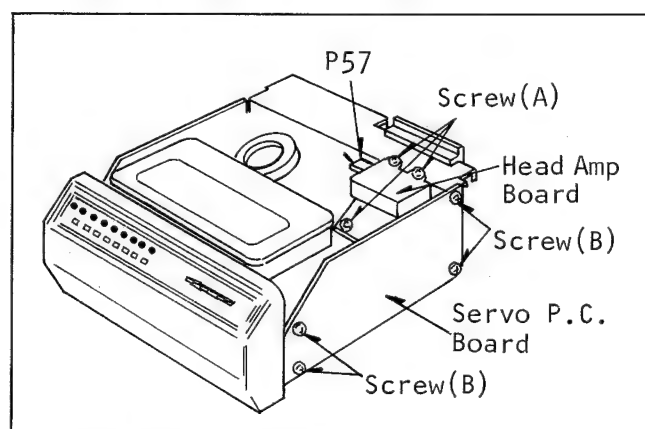


Fig.M34. Replacement of
Pressure Roller Solenoid-(1)

4. Unscrew screw (C), 2 screws (D) and remove the clamber, Spring Hook Angle and P.C. Board Angle.
5. Remove the Retaining Ring and the Washer.

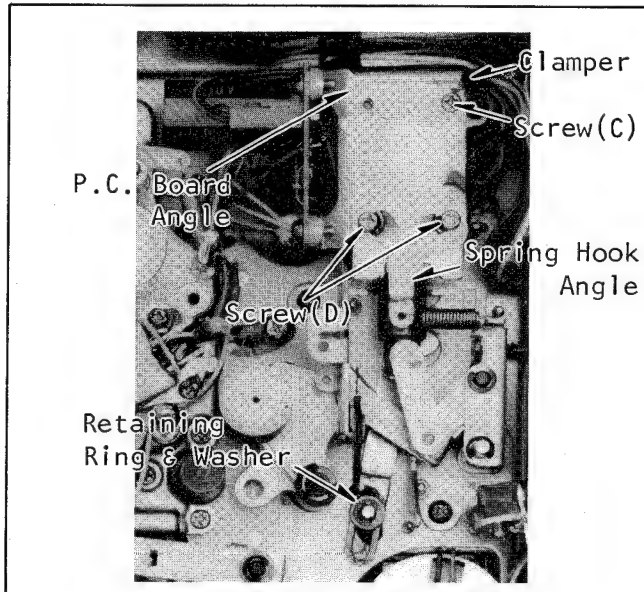


Fig.M35. Replacement of Pressure Roller Solenoid-(2)

6. Unsolder the 5 lead wires from the solenoid.
7. Unscrew the 2 screws (E) and remove the Pressure Roller Solenoid.

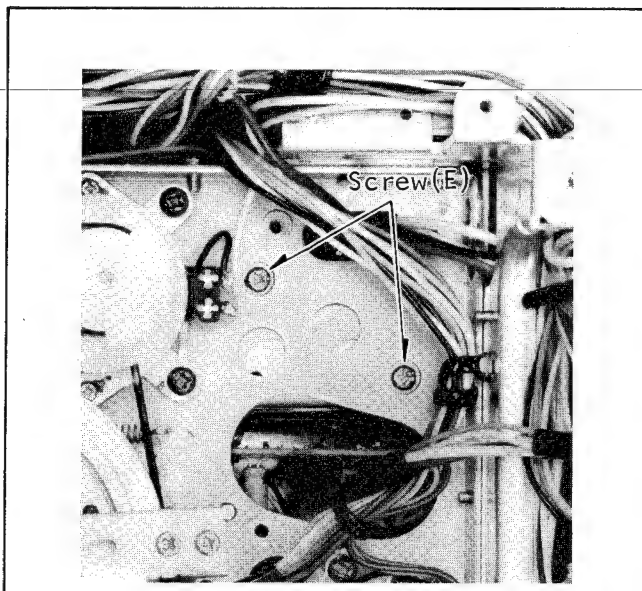


Fig.M36. Replacement of Pressure Roller Solenoid-(3)

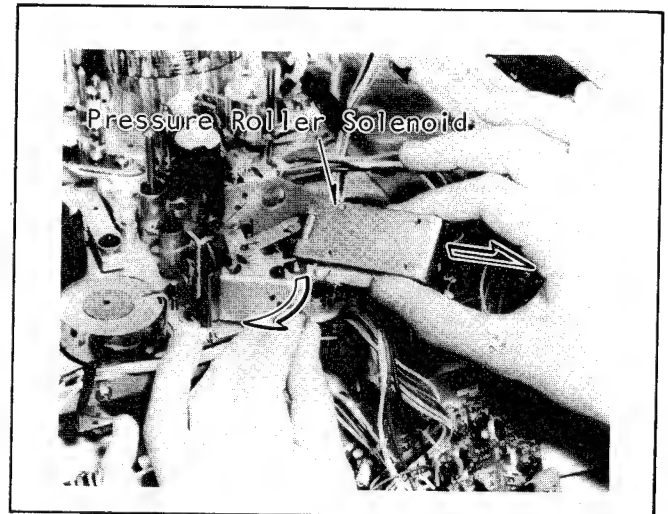


Fig.M37. Replacement of Pressure Roller Solenoid-(4)

8. Install a new plunger and reverse the above steps and perform the adjustment procedures.

Note: Replacement of the plunger is necessary only when it has been broken.

B. Adjustment of Spring Hook Lever

- * Specification: 0.2 ~ 0.5 mm
1. Reverse items 7, 6, 5, 4 of the replacement Procedure.
 2. Press the plunger with your finger to make the quasi-PLAY mode and adjust the screw (A) to obtain the specified clearance.

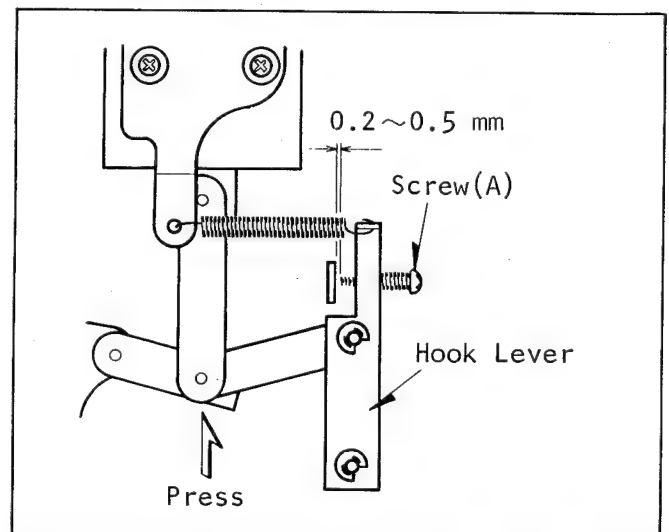


Fig.M38. Adjustment of Hook Lever

Note: When only the adjustment is required, remove the Bottom Case, Top Panel and Cassette Cover. And follow items 2 and 3 of the Replacement Procedure.

C. Confirmation and Adjustment Procedure of Pressure Force

* Specification: 1500 ± 150 grams

* Equipment Required:

Fan-type Tension Gauge (VFK66)

Fine Adjustment Screwdriver (VFK0157)

1. Reverse the items 7, 6, 5, 4 and 3 of the Replacement Procedure. And install the Cassette Compartment.
2. Playback the Cassette Tape.
3. Set a Fan-type Tension Gauge to part (A) of the Pressure Lever.
4. Press the Pressure Lever with gauge in the direction indicated by the arrow.
5. Confirm that the reading of the gauge is within the specification at the moment tape stops.
(Pressure Roller Contact with the Capstan Shaft has been temporarily lifted by applied pressure of the fan-type tension gauge.)
6. If it is out of the specification, loosen the 2 screws (B) slightly, set the Fine Adjustment Screwdriver into the Hole (C) and adjust the position of the Spring Hook Angle by displacing it in the direction indicated by the arrow to obtain the specified pressure force.

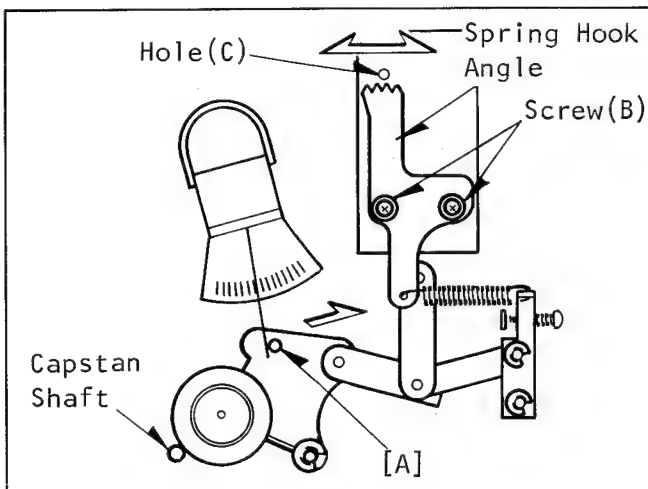


Fig.M39. Adjustment of pressure Force

9. REPLACEMENT OF PRESSURE ROLLER UNIT/ ADJUSTMENT OF CLEARANCE BETWEEN PRESSURE ROLLER AND CAPSTAN SHAFT

A. Replacement Procedure

1. Remove the Bottom Case, Top Panel and the Cassette Compartment.
(Refer to the section of "DIS-ASSEMBLY METHOD", Items 2-1, 2-2 and 2-5).
2. Unscrew the 3 screws (A) and remove the Head Amp Board

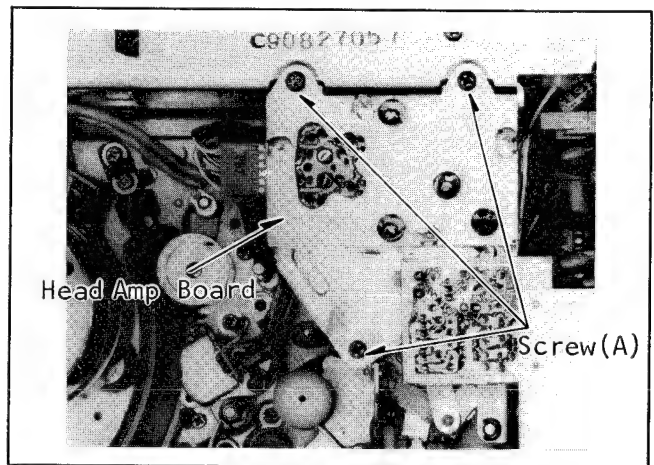


Fig.M40. Replacement of
Pressure Roller-(1)

3. Unscrew screw (B) and remove the clumper.
4. Remove the Retaining Ring (C) and Washer (D), unscrew the 3 screws (E) and remove the Pressure Solenoid Unit.
5. Remove the Retaining Ring (F), Washer (G) and remove the Pressure Roller Unit.

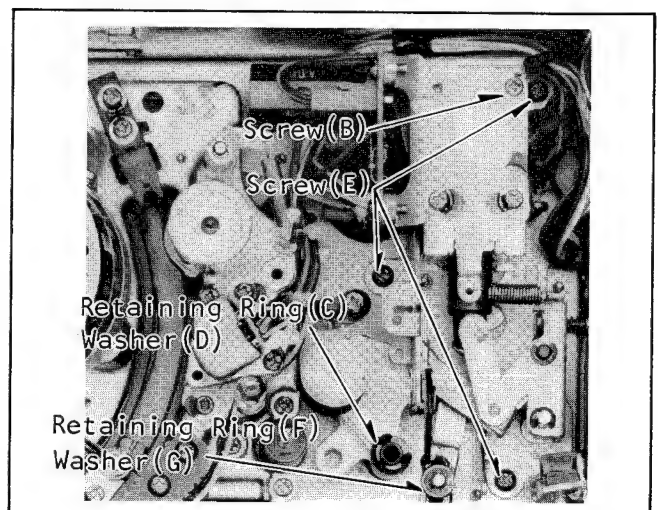


Fig.M41. Replacement of
Pressure Roller-(2)

6. Install a new Pressure Roller Unit and reverse the above steps to complete the installation.

B. Adjustment Procedure

* Specification: 0.3 ~ 0.5 mm

1. Install a new Pressure Roller Unit. (When only the adjustment is required, remove the Bottom Case, Top Panel and the Cassette Cover).
2. Connect the power source and turn power switch ON.
3. Blind the Supply Photo Transistor with your finger and push the Play Button for loading.
4. Push the Pause Button to obtain the Pause Mode.
5. Confirm the clearance first and if it is out of specification, adjust by turning the screw (A) in either direction to obtain the specified clearance.

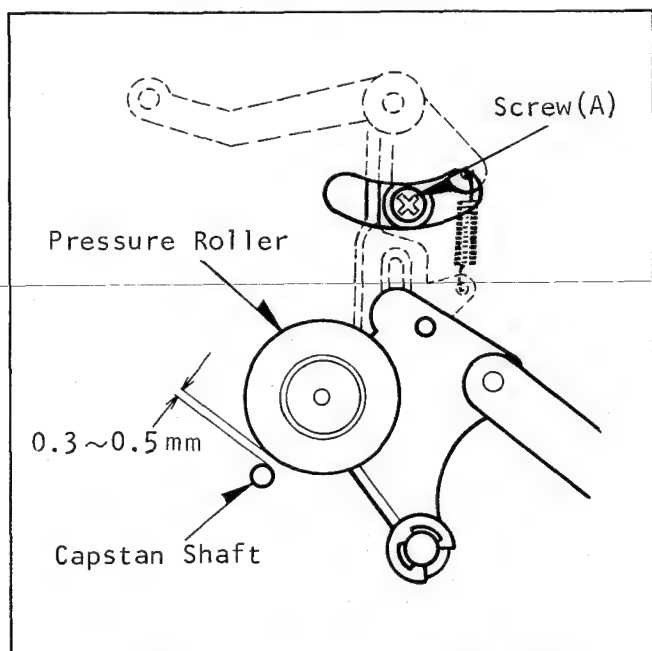


Fig.M42. Adjustment of Clearance

Note: When the Pressure Roller Unit is replaced, "ADJUSTMENT OF CASSETTE COMPARTMENT" should be checked. Refer to its section for details.

10. MEASUREMENT OF TAPE SPEED AND REPLACEMENT OF CAPSTAN BELT

A. Measurement Procedure

* Equipment Required:

Frequency Counter

VHS Alignment Tape (VFM8080H6)

* Specification:

1438 ± 7 Hz

1. Remove the Bottom Case and open the Bottom P.C. Board. (Refer to the section of "DISASSEMBLY METHOD", Items 2-1 and 2-6).
2. Connect the frequency counter to the terminals of the F. G. Head.

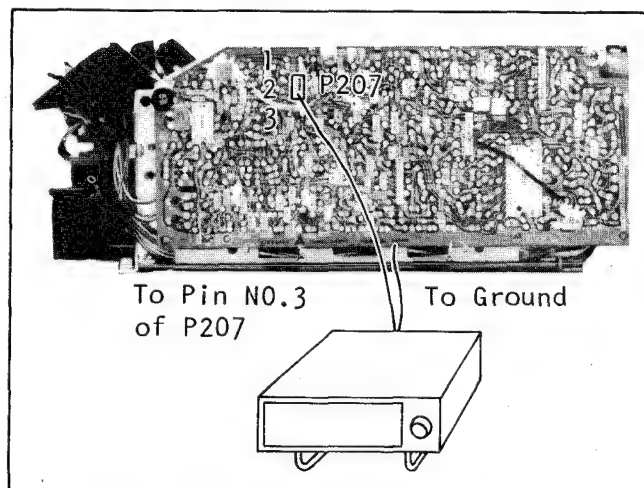


Fig.M43. Measurement of Tape Speed

3. Playback the alignment tape and wait until tape movement is well stabilized.
4. Read the frequency counter and confirm it is within the specification.
5. If it is out of specification, replace the capstan belt.

B. Replacement Procedure

1. Unscrew the 2 screws (A) and remove the Thrust Holder with lead wire bracket.
2. Remove the Idler Belt from the FG Pulley and remove the Capstan Belt.
3. Install the proper Capstan Belt to obtain the correct speed and confirm the tape speed after replacing the belt.
4. Reverse the above steps to complete the installation.

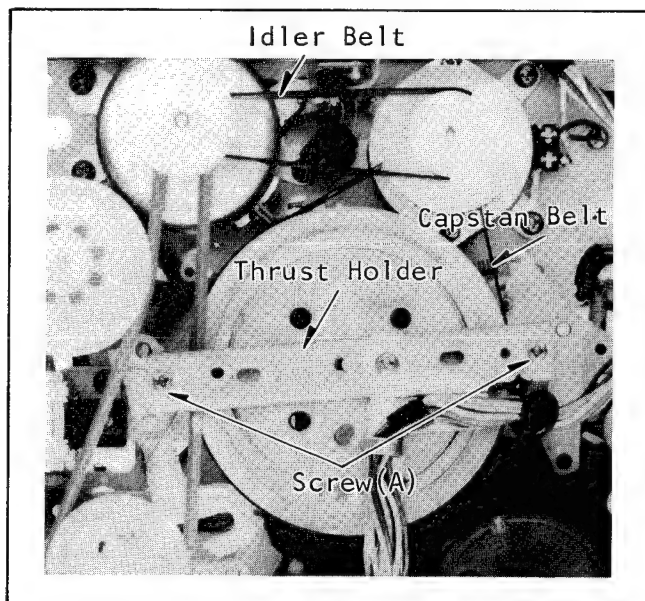


Fig.M44. Replacement of Capstan Belt

Note: When installing a new capstan belt make sure that the marks on the belt are positioned as indicated in the figure.

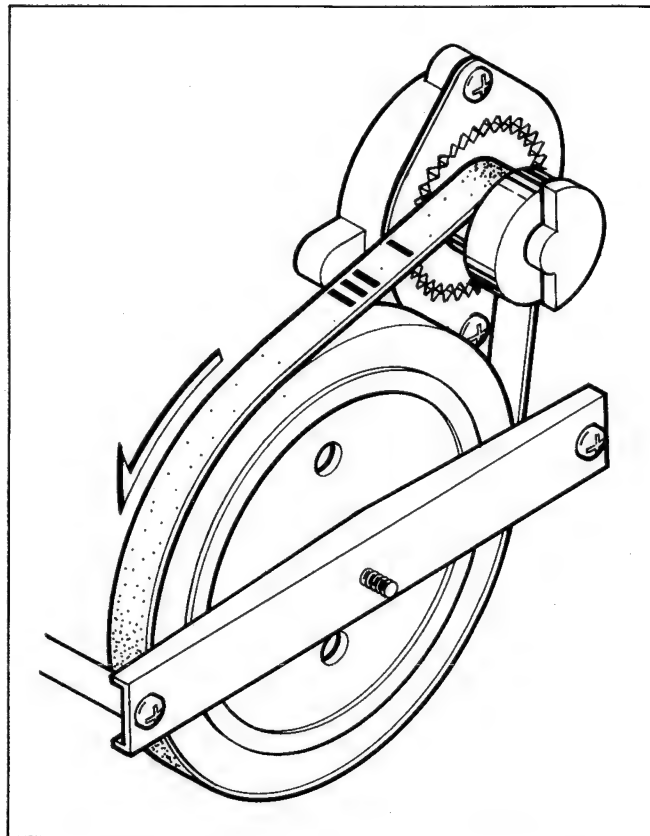


Fig.M46. Installation of Capstan Belt

PART NO.	THICKNESS	MARK ON BELT	CASE OF USE
VDVS0014A	0.52mm.	IIII I	LESS THAN 1431Hz
VDVS0014B	0.55mm.	III I	WITHIN SPEC. 1438±7Hz
VDVS0014C	0.58mm.	IIIII I	MORE THAN 1445Hz

Fig.M45. Marks on Belt

11. REPLACEMENT OF CAPSTAN MOTOR, IDLER BELT AND PLAY BELT

When replacing the Idler Belt, follow steps 1 and 2 and reverse them for installation.

When replacing the Play Belt, follow steps 1 to 3 and reverse them for installation.

When replacing the Capstan Motor, follow steps 1 to 5 and reverse them for installation.

Replacement Procedure

1. Remove the Bottom Case and open the Bottom P.C. Board.
(Refer to the section of "DIS-ASSEMBLY METHOD", Items 2-1 and 2-6).
2. Remove the Idler Belt.
3. Unscrew the 2 screws (A), remove the Thrust Holder and remove the Play Belt.
4. Unscrew the 3 screws (B) and remove the Capstan Motor Unit from the chassis.

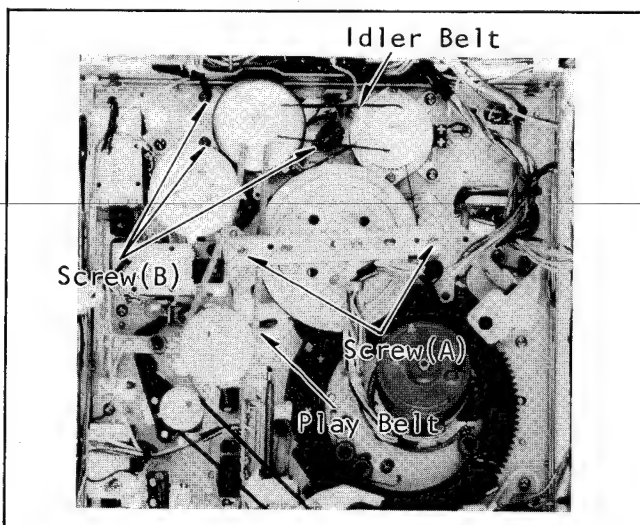


Fig.M47. Replacement of
Capstan Motor-(1)

5. Unsolder the lead wire (orange) from the Motor Capacitor Unit.

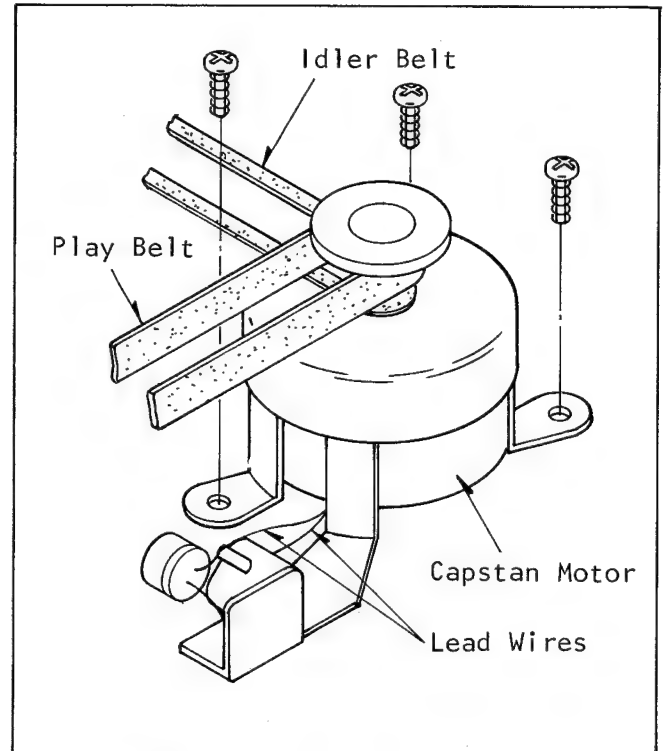


Fig.M48. Replacement of
Capstan Motor-(2)

6. Install a new Capstan Motor and reverse the above steps to complete the installation.

Note: Be sure that the lead wire is resoldered correctly.

12. REPLACEMENT OF LOADING MOTOR, LOADING BELT AND UNLOADING BELT

When replacing the Loading Belt, follow steps 1 to 4 and reverse them for installation.

When replacing the Unloading Belt, follow steps 1 to 5 and reverse them for installation.

When replacing the Loading Motor, follow steps 1 to 8 and reverse them for installation.

Replacement Procedure

1. Remove the Bottom Case, Top Panel and open the Bottom P. C. Board. (Refer to the section of "DIS-ASSEMBLY METHOD", Items 2-1, 2-2 and 2-6).
2. Place the deck vertically so that the Servo P. C. Board side is facing down.
3. Unscrew the 4 screws (A), disconnect the connector (P-615) and open the System Control P. C. Board.

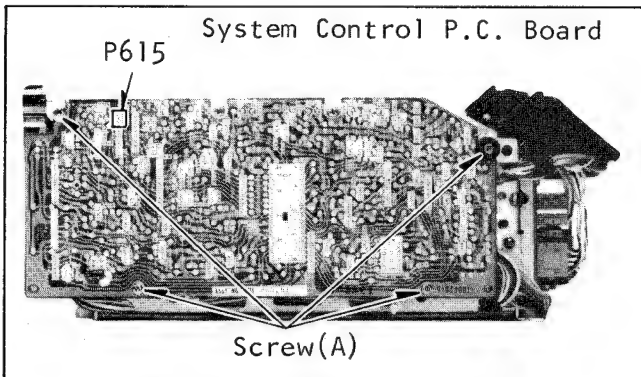


Fig.M49. Replacement of
Loading Motor-(1)

4. Unscrew screw (B), remove the Belt Protector and the Loading Belt from the pulleys.
5. Unscrew 3 screws (C), remove the Belt Guard Plate and Intermediate Pulley. Remove the Unloading Belt.

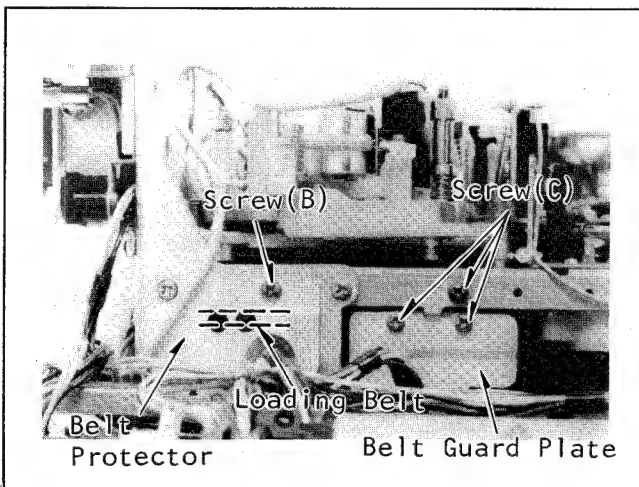


Fig.M50. Replacement of
Loading Motor-(2)

6. Unscrew 2 screws (D) and remove the Loading Motor Bracket.

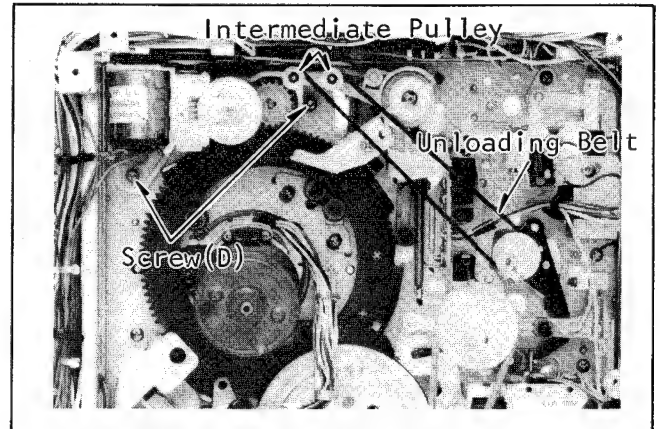


Fig.M51. Replacement of
Loading Motor-(3)

7. Unsolder the 2 lead wires (blue and brown) from the Loading Motor and unscrew the 2 screws (E). Then remove the Loading Motor from the motor bracket.

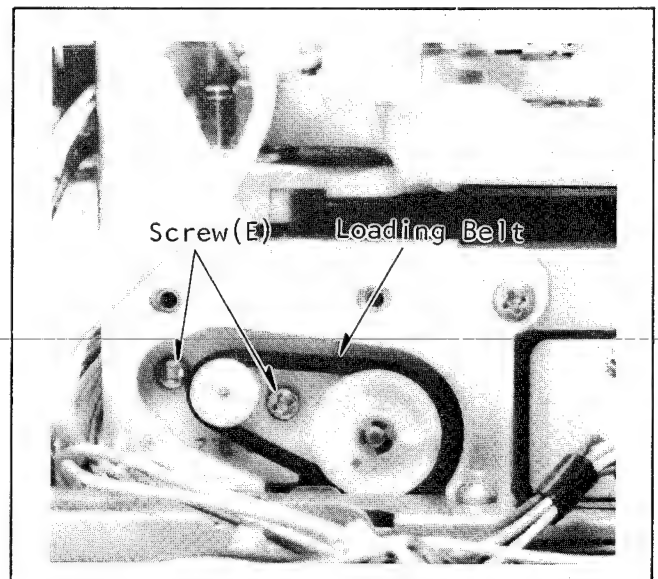


Fig.M52. Replacement of
Loading Motor-(4)

8. Install a new Loading Motor and reverse the above steps to complete the installation.

Notes:

1. When reinstall a new Loading Motor Bracket, be sure that the two threads of gear (A) and (B) can be seen from the window (C) on it and the tooth marked by

red paint is located at the left end of the window. If not, turn the pulley (D) so that to fix the location of it before reinstalling.

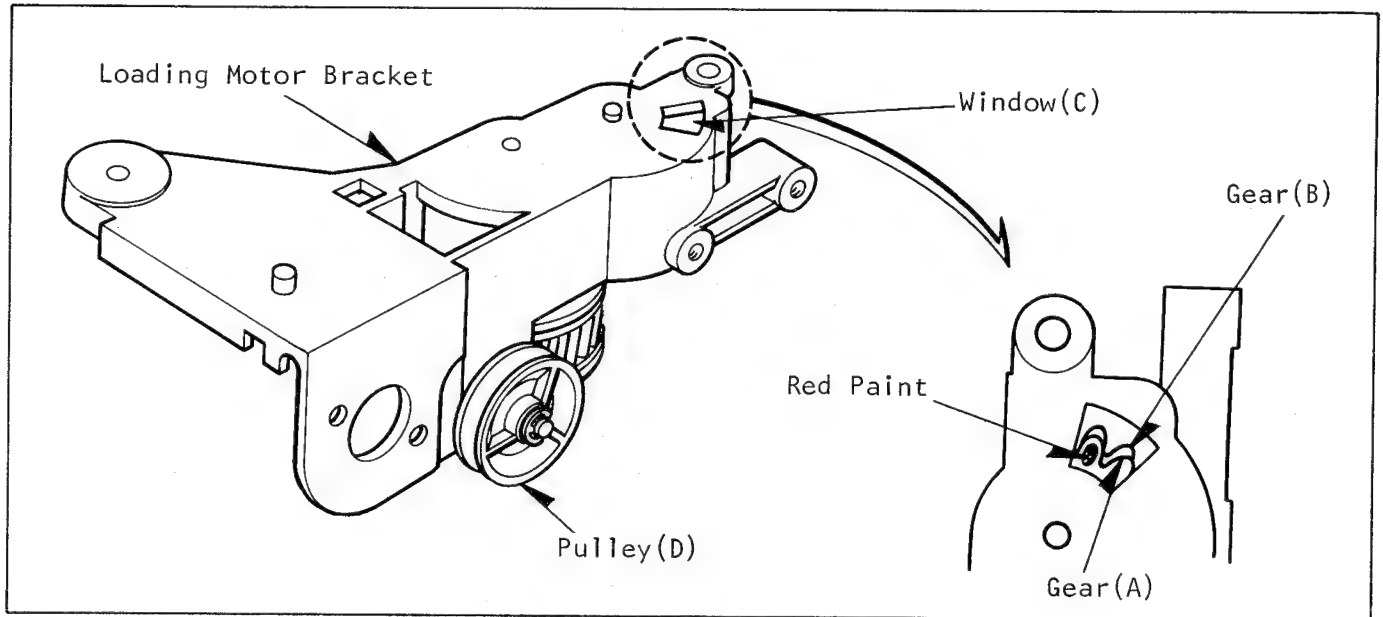


Fig.M53. Reinstallation of Loading Motor-(1)

2. When reinstalling the Loading Motor, manually place the Loading Rings to the loaded position. A rectangular cut-out is visible on the Loading Ring Gear. Place a small screw driver through the rectangular cut-out so that it matches with a hole on the chassis. Now the Loading Motor Assembly can be installed and proper mechanical alignment of the Loading Rings is maintained.

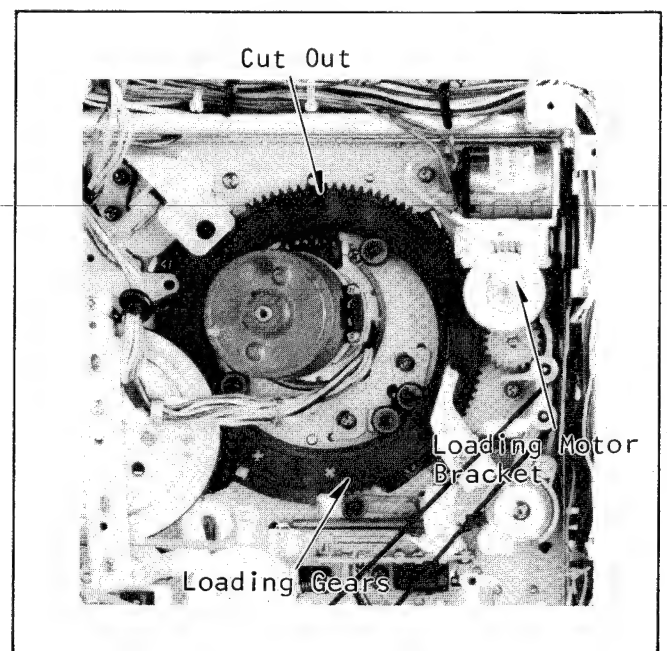


Fig.M54. Reinstallation of Loading Motor-(2)

13. REPLACEMENT AND POSITION ADJUSTMENT OF REWIND SOLENOID

A. Replacement Procedure

1. Remove the Bottom Case, Top Panel and Cassette Compartment.
Open the Bottom P. C. Board.
(Refer to the section of "DIS-ASSEMBLY METHOD", Items 2-1, 2-2, 2-6 and 2-7).
2. Unscrew the screw (A) and remove the clammer.

3. Remove the Retaining Ring, unscrew the 2 screws (B) and remove the Solenoid from Solenoid Bracket.
4. Unsolder the 3 lead wires (green, pink and gray) from the Rewind Solenoid.
5. Install a new Rewind Solenoid and reverse the steps 4, 3 and 2.
Then make the adjustment and reverse the above steps.

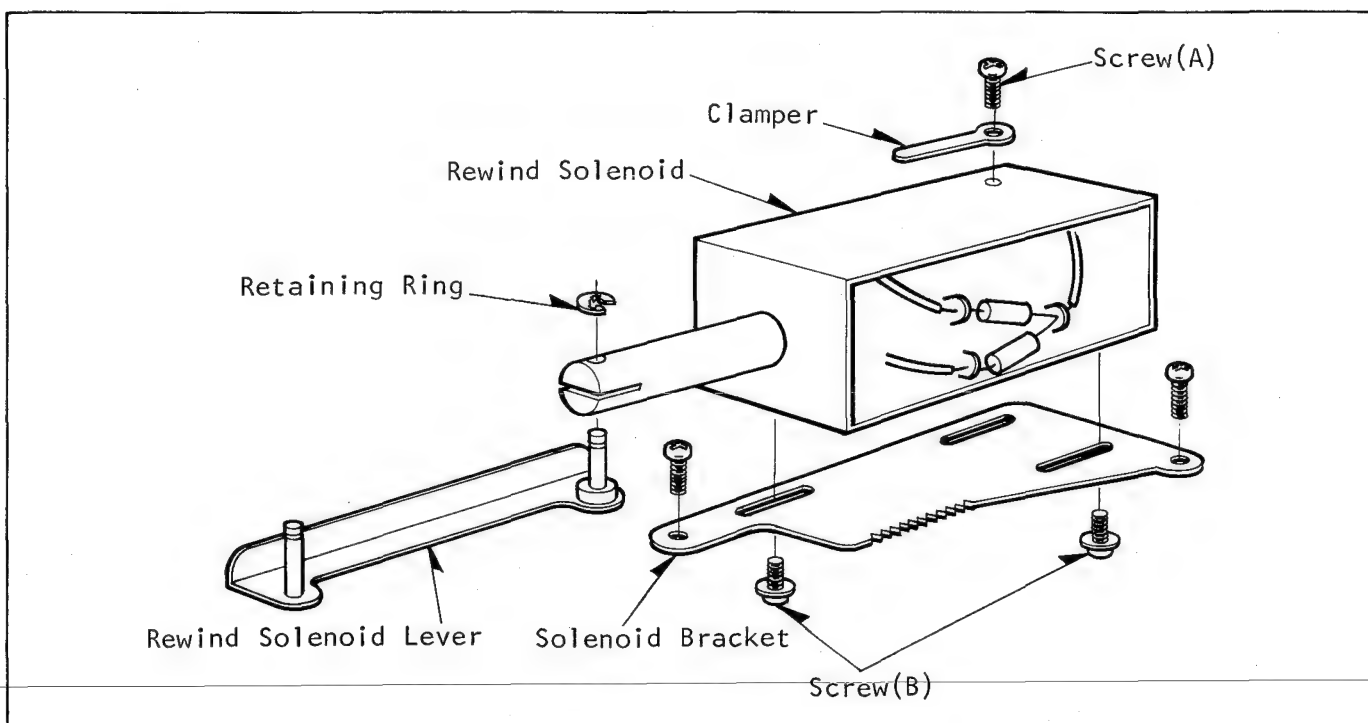


Fig.M55. Replacement of Rewind Solenoid

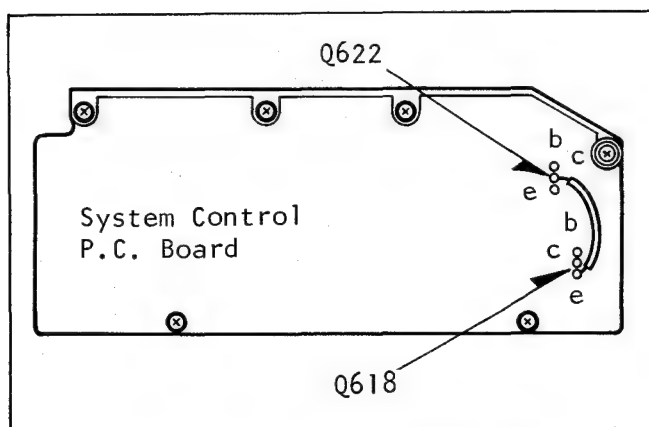


Fig.M56. Location of Q618 & Q622

B. Adjustment Procedure

*Specification: 0.5~1.0 mm

1. Place the deck so that the right side (Servo P.C. Board) is facing down.
2. Connect the collector of Q622 to the emitter of Q618 on the System Control P.C. Board with jumper wire.

3. Slightly loosen the 2 screws (B).
(See Fig. M55).
4. Blind the Takeup Photo-transistor with black opaque tape, connect the power source, turn power switch ON and push the Rewind Button to engage the Rewind Solenoid.
5. Move and adjust the position of the Rewind Solenoid in either direction by your hand to obtain the specified clearance.

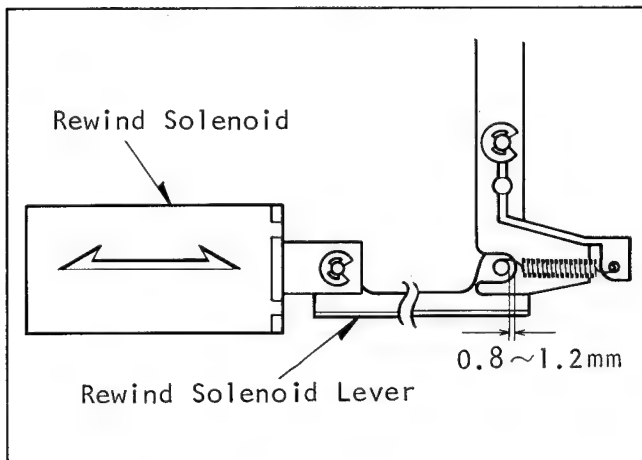


Fig.M57. Adjustment of Rewind Solenoid

Note: Upon completion of the adjustment, "ADJUSTMENT OF CASSETTE COMPARTMENT" also should be checked. Refer to its section for details.

14. REPLACEMENT AND POSITION ADJUSTMENT OF FF SOLENOID

A. Replacement Procedure

1. Remove the Bottom Case, Top Panel and the Cassette Compartment. And open the Bottom P.C.Board. (Refer to the section of "DIS-ASSEMBLY METHOD", Items 2-1, 2-2, 2-6 and 2-7).
2. Unscrew screw (A) and remove the clumper.

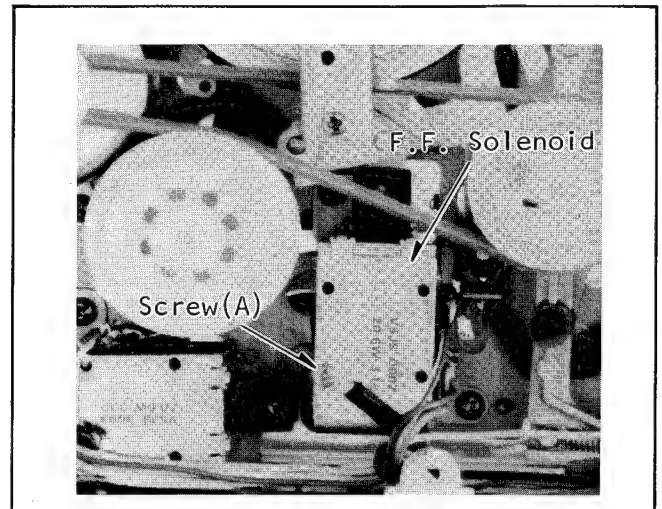


Fig.M58. Replacement of F.F. Solenoid-(1)

3. Unscrew the 2 screws (B) and remove the FF Solenoid from the chassis. Unsolder the 4 lead wires (green, white, red and violet) to remove the FF Solenoid.

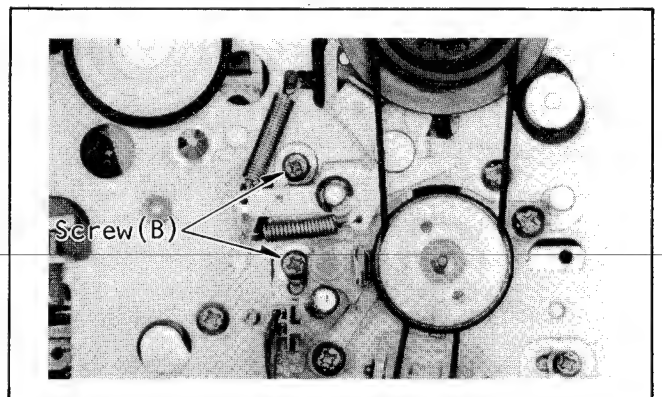


Fig.M59. Replacement of F.F. Solenoid-(2)

4. Install new Rewind Solenoid and reverse the steps 3 and 2. Perform the adjustment procedure.

B. Adjustment Procedure

* Specification: 0.3 ~ 0.7 mm

1. Remove Counter Belt A and loosen the 2 screws (A) slightly. And place the deck so that the right side (Servo P. C. Board) is facing down.

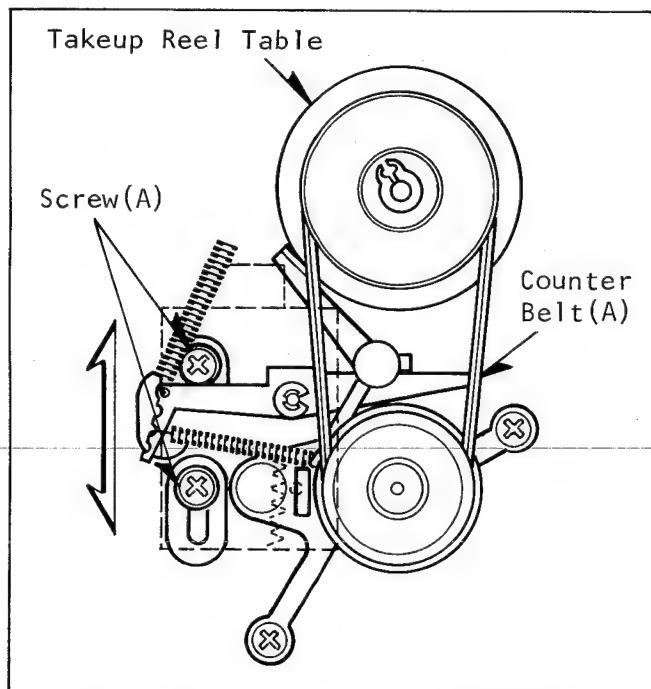


Fig.M60. Adjustment of F.F. Solenoid-(1)

2. Blind the Supply Photo-transistor with black opaque tape, connect the power source, turn power switch ON and push the F. F. Button to engage the FF Solenoid.
3. Move and adjust the position of the F.F. Solenoid in either direction by your hand to obtain the specified clearance.

Note: Upon completion of the adjustment, "ADJUSTMENT OF CASSETTE COMPARTMENT" and "POSITION ADJUSTMENT OF FF MICRO SWITCH BRACKET" also should be checked. Refer to their sections for details.

15. REPLACEMENT OF EJECT SOLENOID

Replacement Procedure

1. Remove the Bottom Case, Top Panel and the Cassette Compartment. And open the Bottom P. C. Board. (Refer to the section of "DIS-ASSEMBLY METHOD", Items 2-1, 2-2, 2-6 and 2-7).
2. Unscrew the screw (A), the 2 screws (B) and remove clumper and the Micro Switch Bracket.
3. Unscrew the 2 screws (C) and remove the Eject Solenoid Bracket.

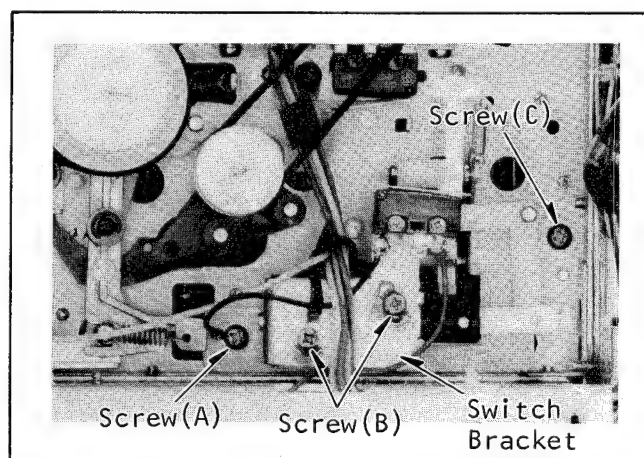


Fig.M62. Replacement of Eject Solenoid

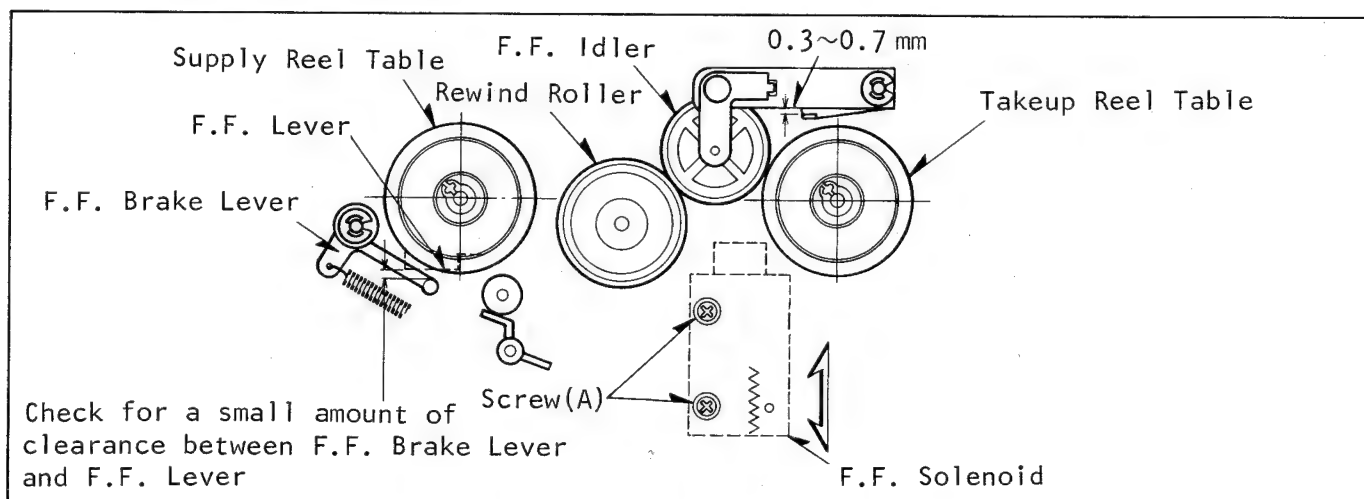


Fig.M61. Adjustment of F.F. Solenoid-(2)

4. Unscrew the 2 screws (D) and remove the Eject Solenoid from the bracket.

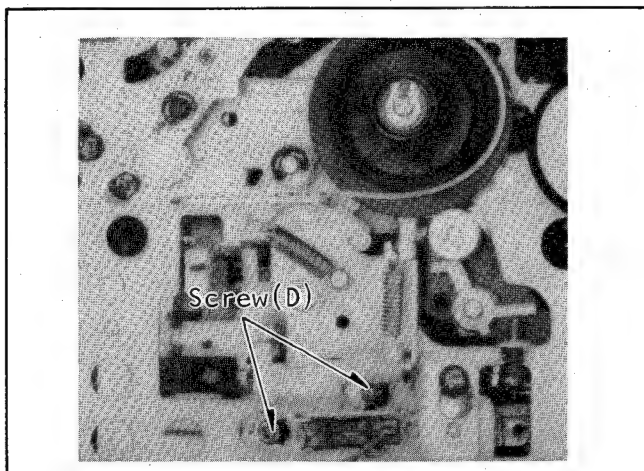


Fig.M63. Replacement of Eject Solenoid-(2)

5. Install a new Eject Solenoid and reverse the above steps to complete the installation.

16. POSITION ADJUSTMENT OF FF MICRO SWITCH BRACKET

Adjustment Procedure

* Equipment Required:

Fine Adjustment Screwdriver (VFK0136)

1. Remove the Bottom Case and open the Bottom P.C. Board. (Refer to the section of "DISASSEMBLY METHOD", Items 2-1 and 2-6.
2. Confirm that both Micro Switches turn ON while pressing the Plunger of F.F. Solenoid fully in the direction indicated. (Listen for the click of the switches carefully).
3. If the micro switches do not turn on adjust the switch bracket position. Loosen screw (A), set the Fine Adjustment Screwdriver into hole (B) and adjust to the position where switches turn ON by displacing the bracket in the direction indicated while the plunger of the solenoid is fully engaged.

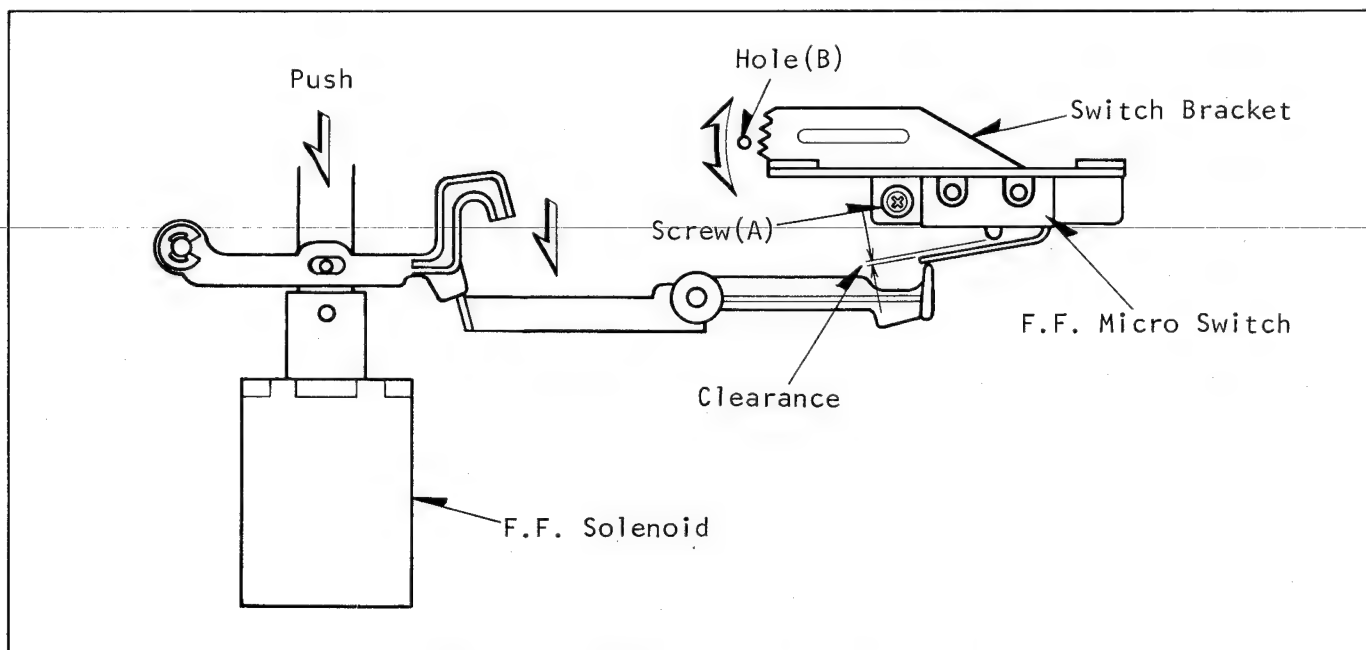


Fig.M64 Adjustment of F.F. Micro Switches

17. CLEARANCE ADJUSTMENT OF BRAKE RATCHET

Adjustment Procedure

* Specification: 0.2 ~ 0.4 mm

1. Remove the Bottom Case, Top Panel, Front Panel and the Cassette Compartment. (Refer to the section of "DISASSEMBLY METHOD", Items 2-1, 2-2, 2-3 and 2-6).
2. Unscrew 4 screws (A) and remove the Audio Circuit Board Assembly.

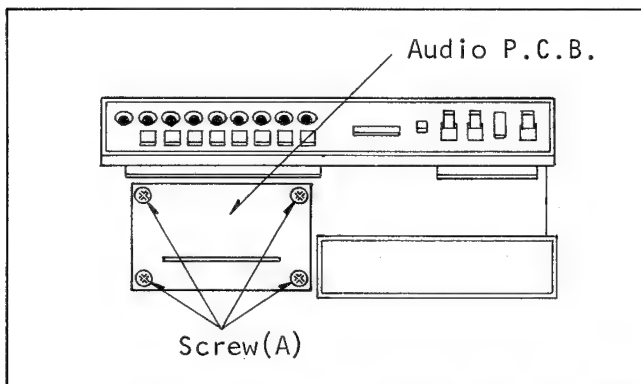


Fig.M65. Removal of Audio P.C.B.

3. Adjust screw (B) to obtain the specified clearance between the Brake Ratchet and screw (B). For easier adjustment, turn screw (B) clockwise until it touches the ratchet and turn counter-clockwise by half to three quarters turn.

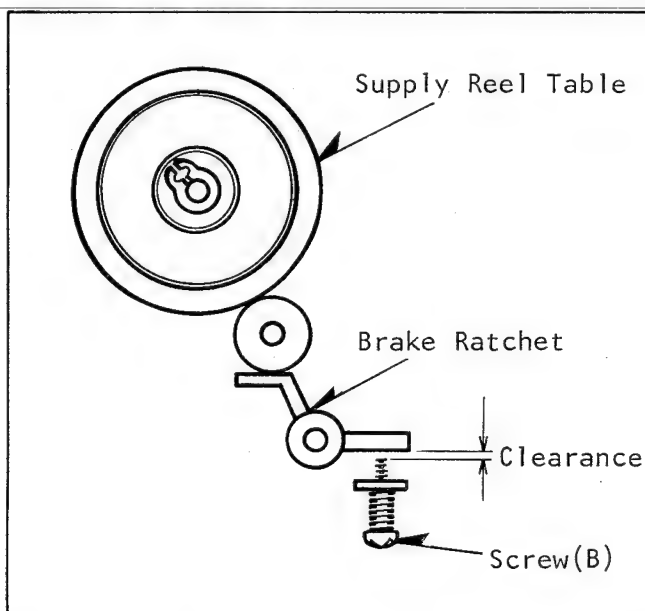


Fig.M66. Adjustment of Brake Ratchet

Note: Upon completion of the adjustment, "ADJUSTMENT OF CASSETTE COMPARTMENT" should be checked. Refer to its section for details.

18. REPLACEMENT AND ADJUSTMENT OF CASSETTE COMPARTMENT AND CASSETTE GUIDE

A. Replacement Procedure

For replacement, refer to the section of "DISASSEMBLY METHOD", Items 2-1, 2-2 and 2-3.

B. Adjustment Procedure

The adjustments of both Cassette Compartment and Cassette Guide can be done together by using the Cassette Compartment Fixture.

* Specification: 0.2 ~ 0.6 mm

* Equipment Required:

Cassette Compartment Fixture
..... (VFK0179)

1. Install the Cassette Compartment, set the 4 screws (A) and screw them a few turns only but do not tighten.
2. Insert the Fixture into the Cassette Compartment and press them down slowly until the Cassette Compartment latches.
3. Pull the Cassette Compartment fully in the direction indicated so that two stoppers on the Cassette Compartment touch the Fixture.
4. Then tighten the 4 screw (A).

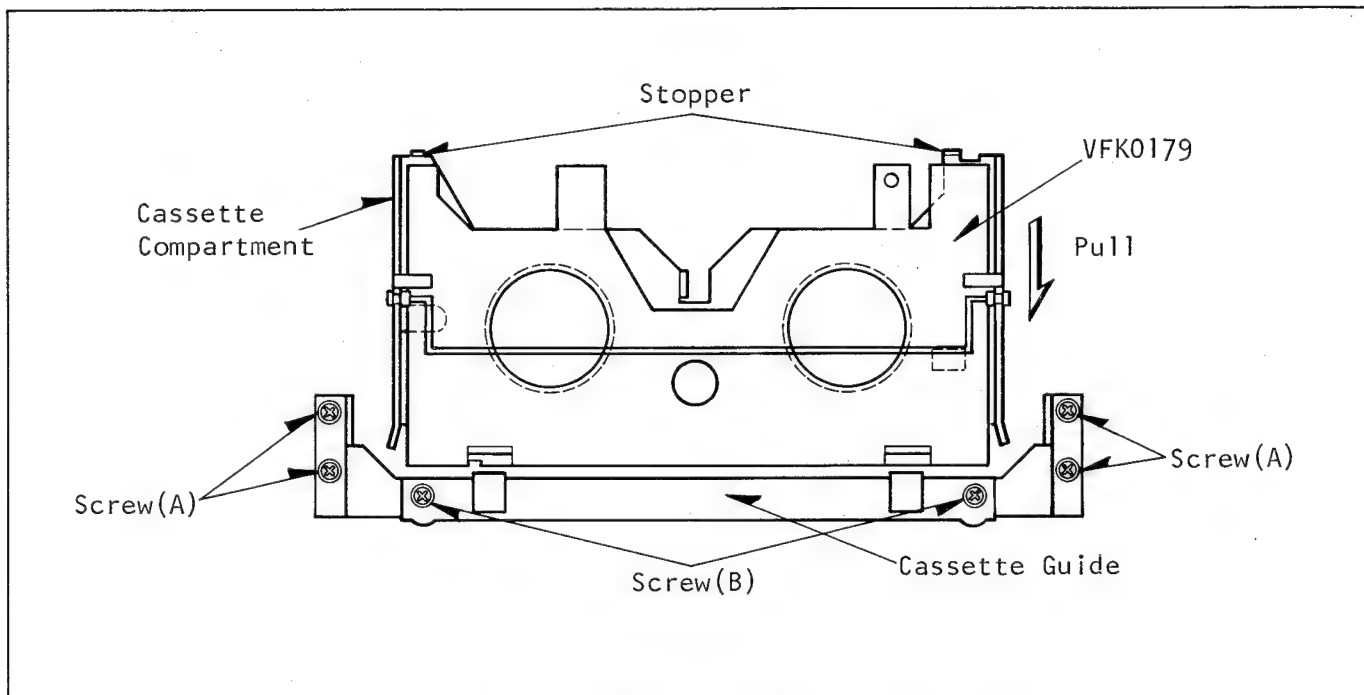


Fig.M67. Adjustment of Cassette Compartment

5. Confirm the clearance between the Cassette Guide and the Fixture. And if it is out of the specification, loosen the 2 screws (B) shown in Fig. M67 and adjust the position of the Cassette Guide to obtain the specified clearance.
6. Connect the power source, turn power switch ON, push the Eject Button and make sure that it has smooth ejection.
7. Insert the Fixture fully and press to confirm that it has smooth action.
8. Repeat the above items 6 and 7 to reconfirm.

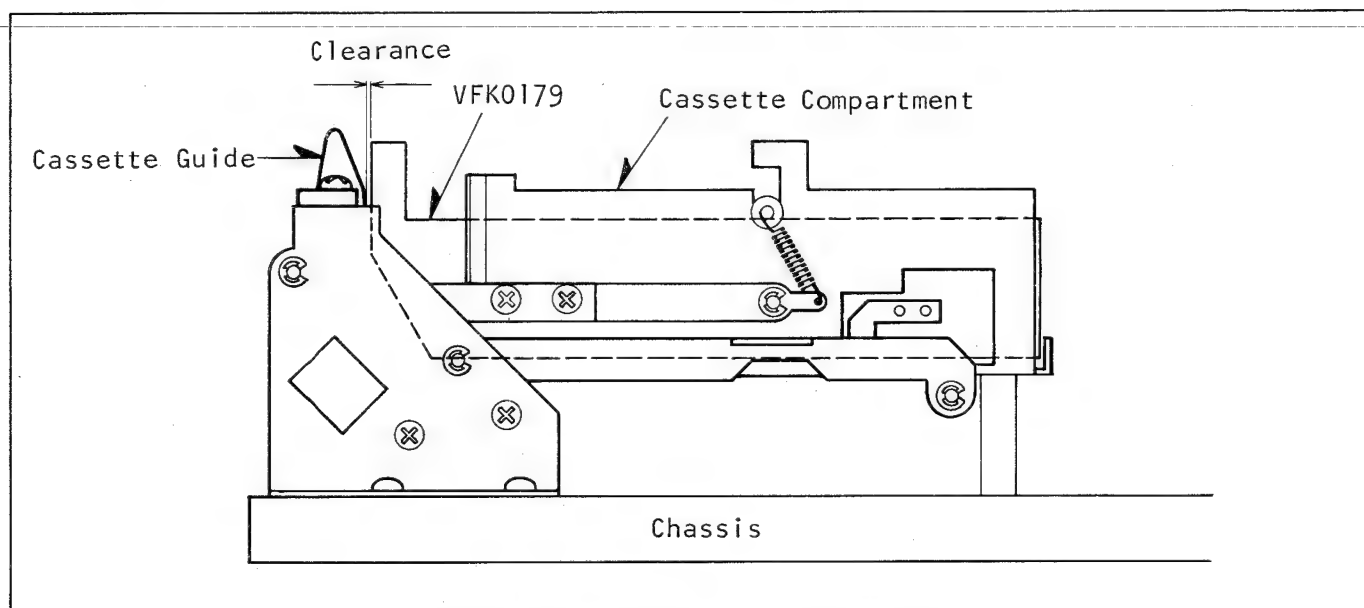


Fig.M68. Adjustment of Cassette Guide

19. POSITION ADJUSTMENT OF SAFETY SWITCH

Adjustment Procedure

* Specification: Clearance: 0 ~ 2 mm

* Equipment Required:

Cassette Compartment Fixture
(VFK0179)

1. Remove the Bottom Case, Top Panel and Cassette Compartment.
(Refer to the section of "DIS-ASSEMBLY METHOD", Items 2-1, 2-2 and 2-7).
2. Place the fixture on the 4 cassette guide pins correctly.

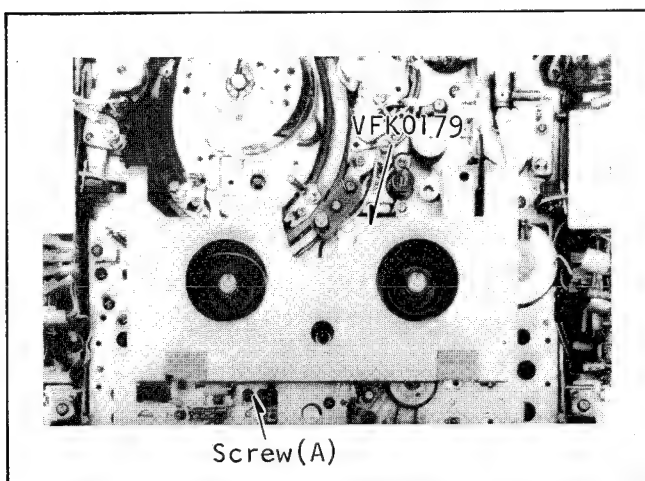


Fig.M69. Adjustment of Safety Switch-(1)

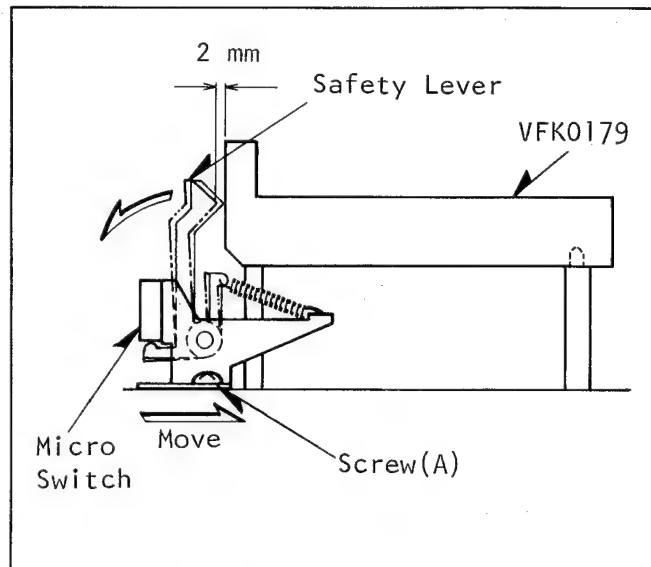


Fig.M70. Adjustment of Cassette Guide

5. Repeat steps 3 and 4 if necessary to be sure of proper adjustment.
6. Reinstall the remove parts.

Note: Upon completion of the adjustment, "ADJUSTMENT OF CASSETTE COMPARTMENT" should be checked. Refer to its section for details.

20. CONFIRMATION OF TAKEUP FORCE

Confirmation Procedure

* Specification:

in Play Mode	80 ~ 160 g-cm
in F.F. Mode	350 g-cm
in Rewind Mode	400 g-cm

* Equipment Required:

Dial Torque Gauge (VFK0133)
Adaptor for Torque Gauge
..... (VFK0134)

1. Remove the Bottom Case, Top Panel and Cassette Cover. (Refer to the section of "DISASSEMBLY METHOD", Items 2-1, 2-2 and 2-4).
2. Attach the Adaptor to the Torque Gauge.
3. Connect the power source and turn power switch ON.
4. Blind the Photo-transistors (Supply & Takeup) with black opaque tape.

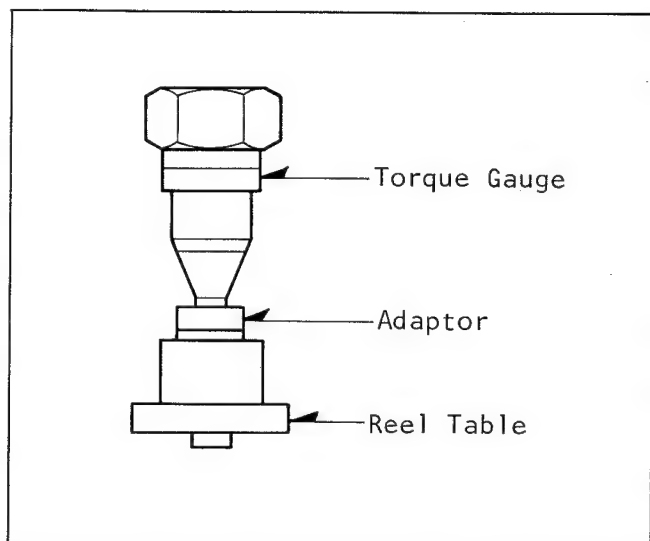


Fig.M71. Confirmation of Takeup Force

5. Set the Torque Gauge to the Take-up Reel Table, push the Play Button and take the gauge reading.
6. Make the same measurement for F.F. and Rewind Modes.
7. Remove the black opaque tape after measurement.

Notes:

1. When measuring, make sure that there is no slippage between Idler and Reel Tables as well as Idlers.
2. While measuring, the weight of Torque Gauge should be free against the Reel Tables.
3. There are no adjustments here. If the torque readings are off considerably, rollers or idlers or reel tables may need replacement.

21. REPLACEMENT AND HEIGHT ADJUSTMENT OF REEL TABLES

A. Replacement Procedure

* Equipment Required:

Retaining Ring Remover, (4 mm)
..... (VFK0145)

Remove the Bottom Case, Top Panel and the Cassette Compartment.

(Refer to the section of "DIS-ASSEMBLY METHOD", Items 2-1, 2-2 and 2-7).

(TAKEUP REEL TABLE UNIT)

1. Remove the Connector Belt A from the pulleys.
2. Remove the Retaining Ring, Washer and Takeup Reel Table Unit from the shaft.

(SUPPLY REEL TABLE UNIT)

1. Unscrew the screw (A), remove the Retaining Ring, Washer and Supply Reel Table Unit from the chassis.

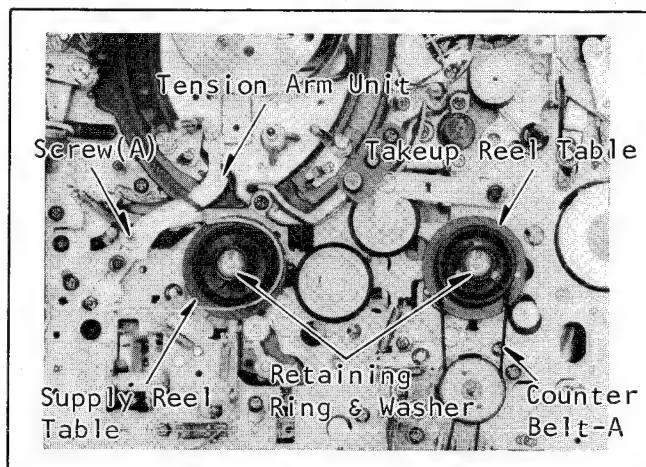


Fig.M72. Replacement of Reel Tables

Notes:

1. Unless the reads of gauge are out of specification, the slippage which occurs between idler and reel tables as well as idlers is acceptable.
2. Make sure that any washers do not remain at the bottom of removed Reel Tables.
3. Upon completion of the replacement, "ADJUSTMENT OF CASSETTE COMPARTMENT" should be checked. Refer to its section for details.

B. Adjustment Procedure

* Specification: 0 ~ 0.2 mm

* Equipment Required:

Post Adjustment Plate (VFK0138)

Reel Table Height Fixture (VFK0139)

1. Place the Post Adjustment Plate on the 4 cassette guide pins correctly.
2. Set the Dial Gauge into the U-Shaped Block and place it on the Adjustment Plate.
3. Fit the sensor of the Dial Gauge on the cut-out portion of the Adjustment Plate and set the pointer of gauge to 0 (zero).

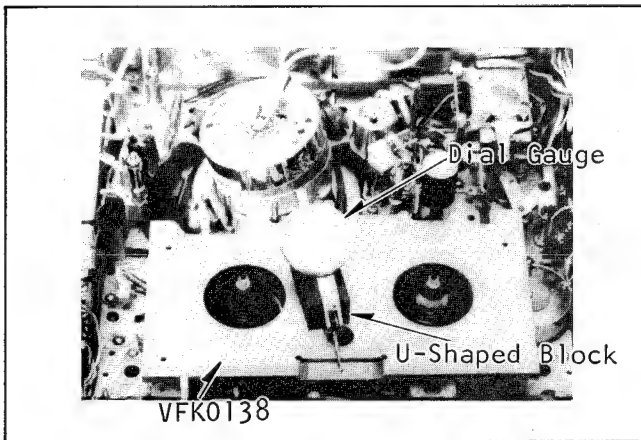


Fig.M73. Height Adjustment-(1)

4. Fit the sensor of the Dial Gauge on the top of the Reel Table and read the gauge. When the top of the Reel Table is higher than the cut-out portion, it shows on the gauge, however if the Reel Table is lower than the cut-out, it does not. In that case, slightly press the sensor until it touches the Reel Table, then read the gauge.

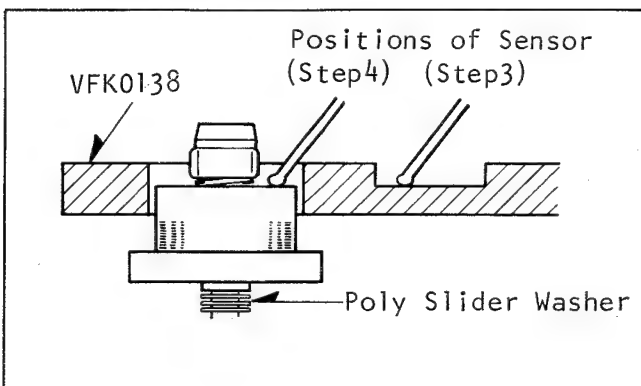


Fig.M74. Height Adjustment-(2)

5. Confirm that the difference of the readings between step 3 and step 4 is within specification. If it is out of spec., then adjust the height of the Reel Table by changing the Poly Slider Washer located under the Reel Table. (The washer is available in sizes of 0.13 mm., 0.25 mm. and 0.5 mm. of thickness).

Note: Upon completion of the adjustment, "ADJUSTMENT OF CASSETTE COMPARTMENT" should be checked. Refer to its section for details.

22. HEIGHT ADJUSTMENT OF TAPE GUIDE POST

Adjustment Procedure

* Equipment Required:

Post Adjustment Plate (VFK0138)

Post Adjustment Screwdriver (VFK0137)

Block Gauge (VFK0139)

Hex. Wrench 0.9 mm (VFK0146)

Nut Driver 7 mm
(Purchase from local supplier)

Note: This procedure is just the pre-adjustment of the "TAPE INTER-CHANGEABILITY ADJUSTMENT" for 4 tape guide posts, if does not by itself constitute the final interchangeability adjustment.

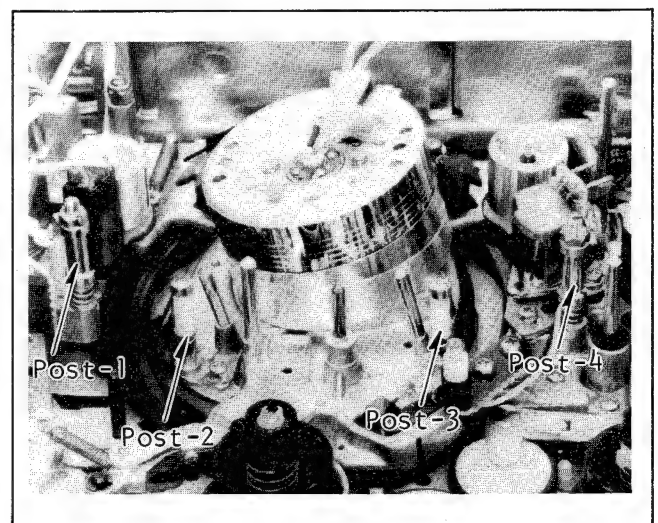


Fig.M75. Location of Posts

1. Remove the Bottom Case, Top Panel and the Cassette Compartment. (Refer to the section of "DISASSEMBLY METHOD", Items 2-1, 2-2 and 2-7).
2. Place the Post Adjustment Plate on the 4 cassette guide pins correctly and put the Block Gauge on it.

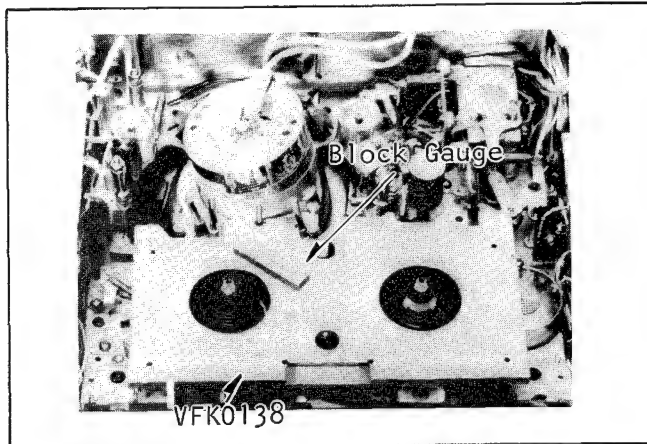


Fig.M76. Post Adjustment Plate & Gauge

3. Fit the block gauge against each post.
4. Loosen the locking hex. screws of posts (P2 and P3), then turn the top of the post counter clockwise with post adjustment screwdriver to obtain the condition (C) shown in Fig. M78.

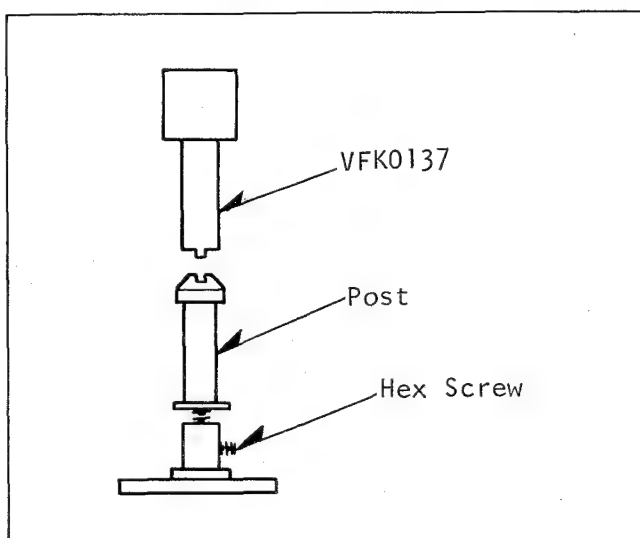


Fig.M77. Post Height Adjustment-(1)

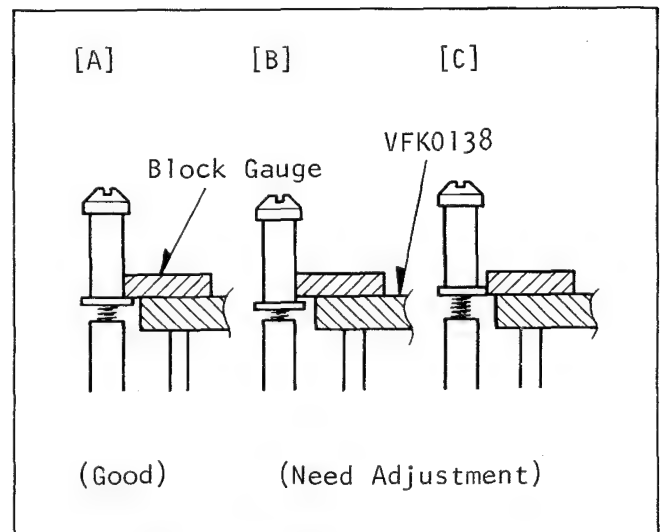


Fig.M78. Post Height Adjustment-(2)

5. Then, slightly press the block gauge against the post sleeve and turn the top of the post clockwise with post adjustment screwdriver until to obtain the condition (A) shown above.
6. Make the same adjustment for posts (P1 and P4) with nut driver.

Note: Upon completion of the adjustment, "ADJUSTMENT OF CASSETTE COMPARTMENT" should be checked. Refer to its section for details.

23. TAPE INTERCHANGEABILITY ADJUSTMENT

* Equipment Required:

- Alignment Tape (VFM8080H6)
 - Eccentric Screwdriver (VFK0135)
 - Post Adjustment Screwdriver (VFK0137)
 - Hex. Wrench 0.9 mm (VFK0146)
 - Hex. Wrench 1.5 mm. (VFK76)
 - Oscilloscope
 - Nut Driver 7 mm
- (Purchase from local supplier)
- Remove the Bottom Case, Top Panel and the Cassette Cover. (Refer to the section of "DISASSEMBLY METHOD", Items 2-1, 2-2 and 2-4).

A. Pre-adjustment for Height of Posts

To prevent the alignment tape from being damaged, use a normal cassette tape for the pre-adjustment.

1. Playback a cassette tape and confirm that tape travels without curling at the edges of the tape.

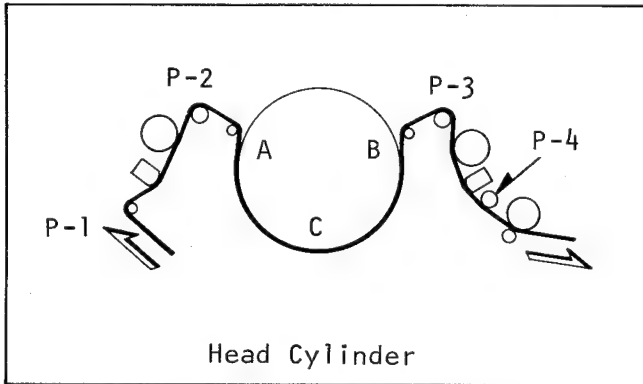


Fig.M79. Location of Posts

2. If curling is apparent, adjust the height of post by turning the top of post with the post adjustment screwdriver or nut driver.

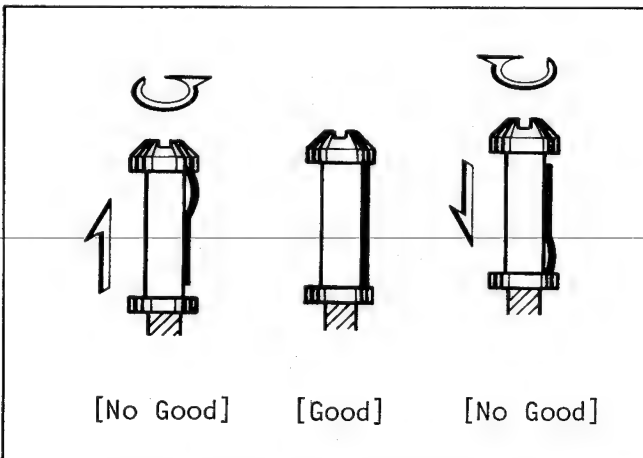


Fig.M80. Post Height Adjustment-(3)

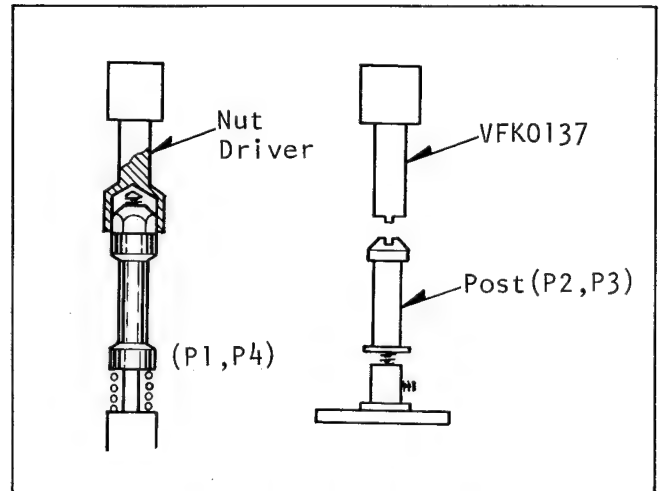


Fig.M81. Post Height Adjustment-(4)

3. Confirm that lower edge of the tape is passing along the lower edge of the control head as shown below.

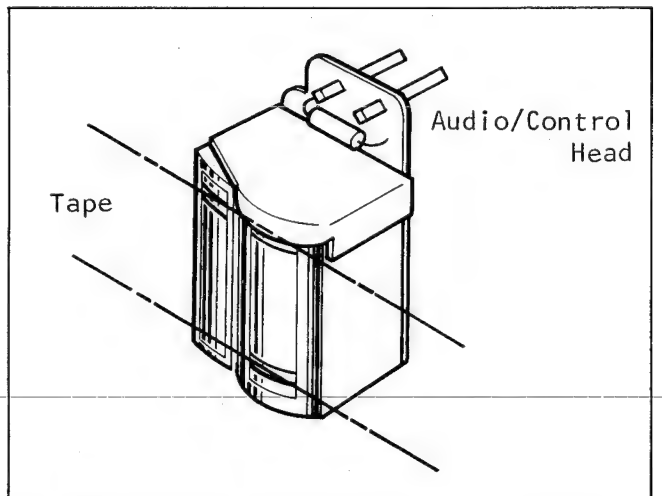


Fig.M82. Height Adjustment of A/C Head-(1)

4. If not, turn the 2 screws (A) and (B) in the same direction and same number of turns, also turn the screw (C) so that the height of the Audio Control Head becomes as shown above.

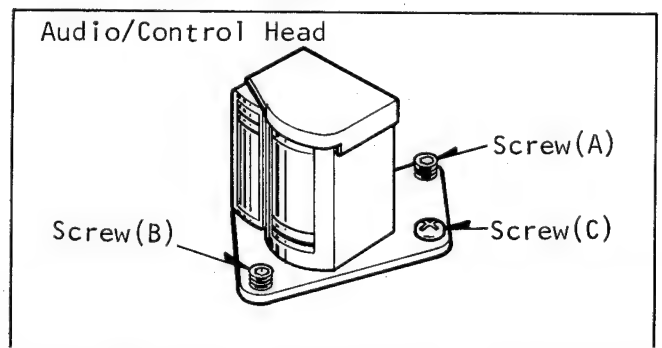


Fig.M83. Height Adjustment of A/C Head-(2)

B. Fine Adjustment of Tape Travel

B-1. Elimination of Tape Crease and Slack

1. Watch the portions between Post (P2) and A as well as Post (P3) and B carefully, while playing back the cassette tape. (See Fig. M79).
2. If tape crease or slack is apparent at any portion, adjust the position of the inclined base. To adjust it, loosen screw (A) slightly, set the eccentric screwdriver to the hole (B) and move the base to eliminate creases.

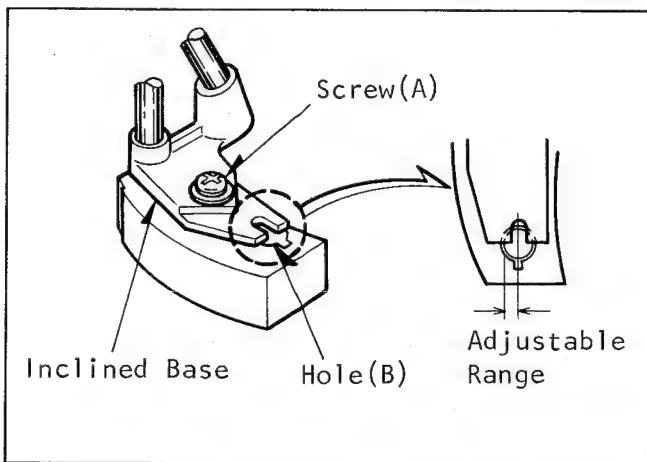


Fig.M84. Adjustment of Inclined Base

B-2. Post Height Adjustment

For this adjustment, the deck should be placed in the upright position. Connect the oscilloscope to TP520 on Head Amp. Board.

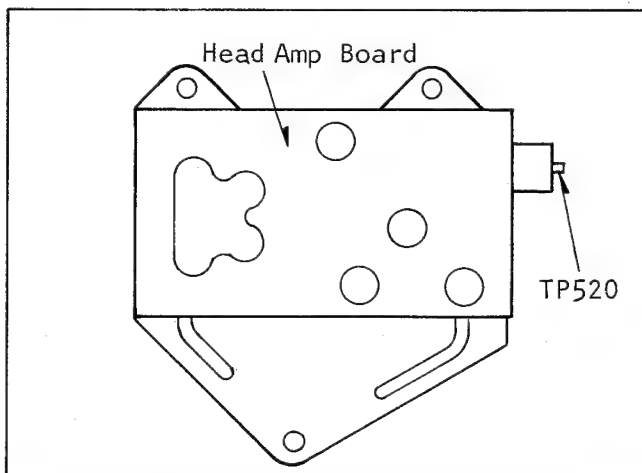


Fig.M85. Head Amp Board & TP520

While playing back the monoscope portion of the alignment tape VFM8080H6, adjust post P1, P2 and P3 by watching the scope display (Envelope of TP520 on Head Amp. Board) so that the RF envelope on the scope becomes as flat as possible ($V1/V_{max} \geq 0.7$, $V2/V_{max} \geq 0.7$).

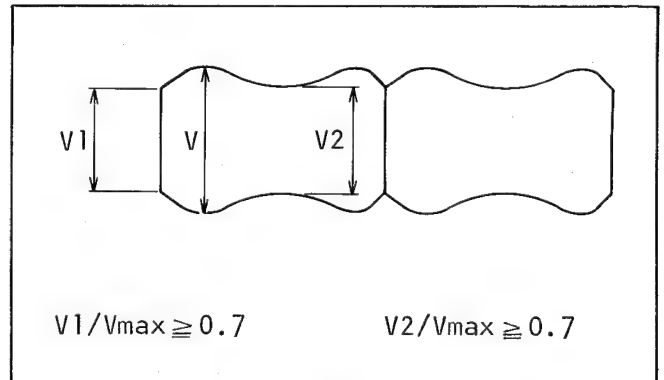


Fig.M86. Envelope on TP520

1. When the scope display is as follows, adjust the height of P2 shown in the Fig. M79.

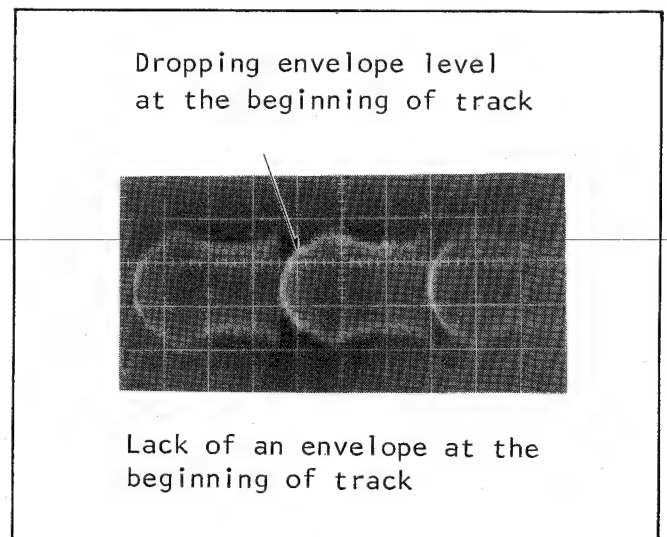
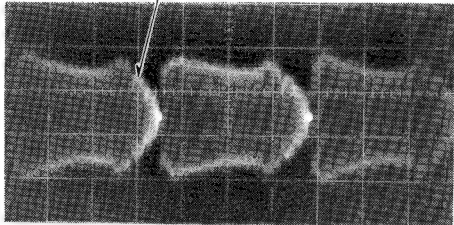


Fig.M87. Envelope Figure-(1)

- When the scope display is as follows, adjust the height of P3 shown in the Fig. M79.

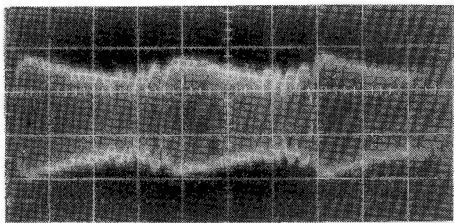
Dropping envelope level
at the end of track



Lack of an envelope at the
end of track

Fig.M88. Envelope Figure-(2)

- The scope display with P1 and P2 adjusted correctly should become as shown below.



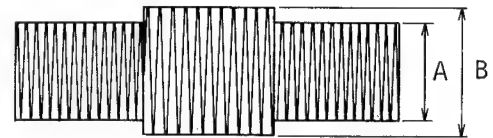
Envelope is adjusted properly

Fig.M89. Envelope Figure-(3)

B-3. Head Amp. Output Adjustment

- Set the deck with the condition of no connections of Video and Audio inputs.
- Make a recording of FM carrier signal which appears inside of the deck when no signal is applied to the video input.
- Playback the portion just recorded in the step 2.
- Connect the scope to Test Point, TP520 on Head Amp. Board.
- Confirm the scope display that the outputs of both channels are equal. If not, adjust Mix. (R591) on Head Amp. Board so that channel A and channel B outputs are equal.

TP520



Head Amp Output

Fig.M90. Head Amp Output Adjustment

B-4. Audio Control Head Position Adjustment

Before adjusting, make sure that the Tracking Control is set to the center detent position.

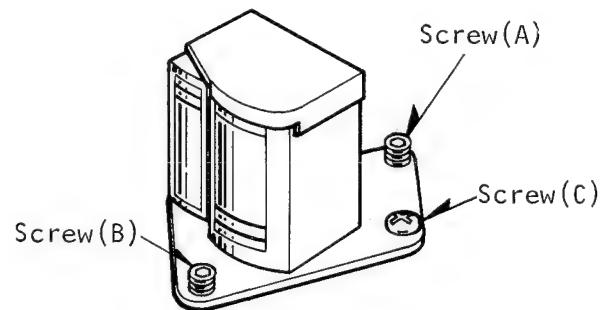


Fig.M91. Height Adjustment of A/C Head

B-4-1. (Height Adjustment)

- Connect the scope to the audio output jack on the rear of the deck.
- Playback the monoscope portion (6kHz, Audio) of the alignment tape, VFM8080H6.
- Adjust the height of 2 hex. screws (A), (B) and the screw (C) shown in the Fig. M91 to obtain the maximum output level.

(6KHz,Audio)

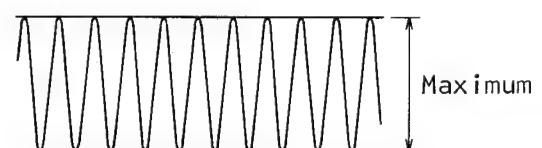


Fig.M92. Maximum Output Level

B-4-2. (Tilt Adjustment)

1. Connect oscilloscope to TP520 on Head Amp. Board.
2. While playing back the monoscope portion of the alignment tape VFM8080H6, adjust the 2 hex. screws (A) and (B) shown in Fig. M91 for maximum RF envelope on the scope.

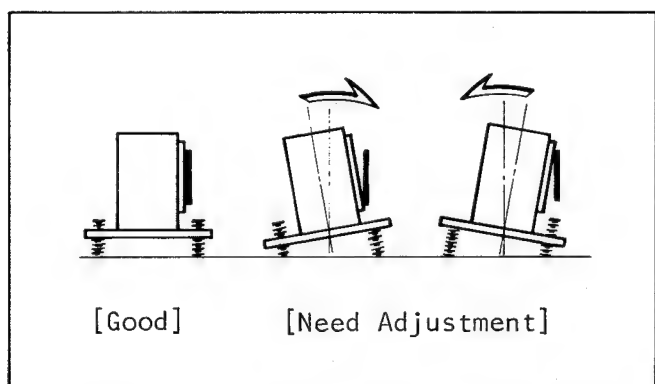


Fig.M93. Tilt Adjustment of A/C Head

B-4-3. (Horizontal Position Adjustment)

1. Connect the oscilloscope to TP520 on Head Amp Board. And set the tracking control into the detent (fixed) position.
2. Play back the monoscope portion of the alignment tape VFM8080H6, slightly loosen the 2 screws (A) and move the A/C Head in parallel with the direction of tape travel for the maximum RF envelope on the scope. Then tighten the 2 screws (A). (Be sure to perform this step slowly and smoothly, as a few seconds for servo lock-up time is required for the scope display to stabilize.)

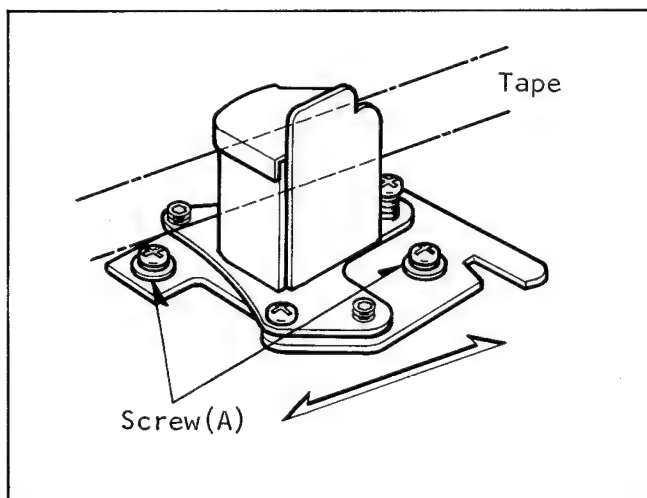


Fig.M94. H-Position Adjustment of A/C Head

3. Slightly loosen the screw (C), set the fine adjustment screwdriver into the hole (D) and carefully move the A/C head base fine adjustment plate in either direction indicated so that the output level becomes maximum. Then tighten the screw (C).

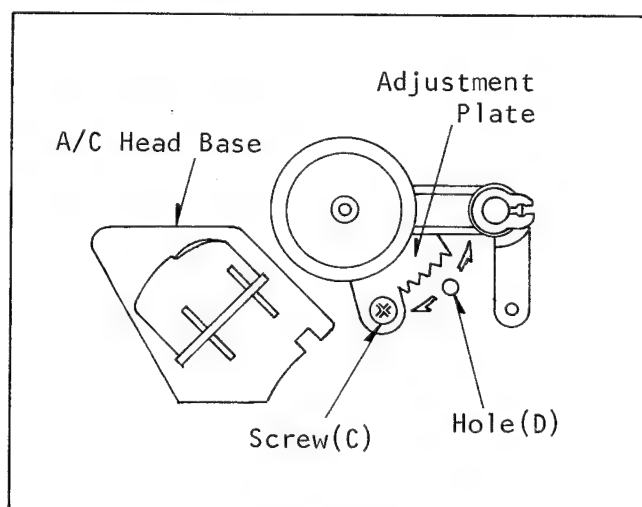


Fig.M95.

24. REPLACEMENT OF PLAY IDLER

Replacement Procedure

* Equipment Required:

Hex. Wrench 1.5 mm (VFK76)

1. Remove the Bottom Case, Top Panel and Cassette Compartment.
Open the Bottom P.C. Board.
(Refer to the section of "DIS-ASSEMBLY METHOD", Item 2-1, 2-2, 2-6 and 2-7).
2. Unscrew the Hex. Screw (A) and remove the Play Idler.
3. If Play Clutch requires replacement, remove it at this time.
4. Install new part and reverse the above steps to complete the installation.

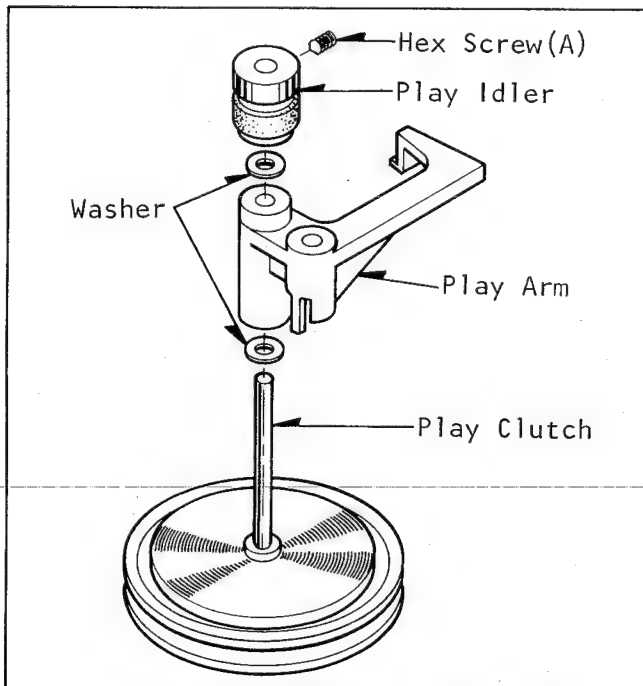


Fig.M96. Replacement of Play Idler

Note: Upon completion of the replacement, "ADJUSTMENT OF CASSETTE COMPARTMENT" should be checked. Refer to its section for details.

25. REPLACEMENT OF TAKEUP REEL BRAKE

Replacement Procedure

1. Remove the Bottom Case, Top Panel and the Cassette Compartment.
(Refer to the section of "DIS-ASSEMBLY METHOD", Items 2-1, 2-2 and 2-5).
2. Remove the Spring, Retaining Ring, Washer and the Takeup Reel Brake Unit from the shaft.
3. Install a new one and reverse the above steps to complete the installation.

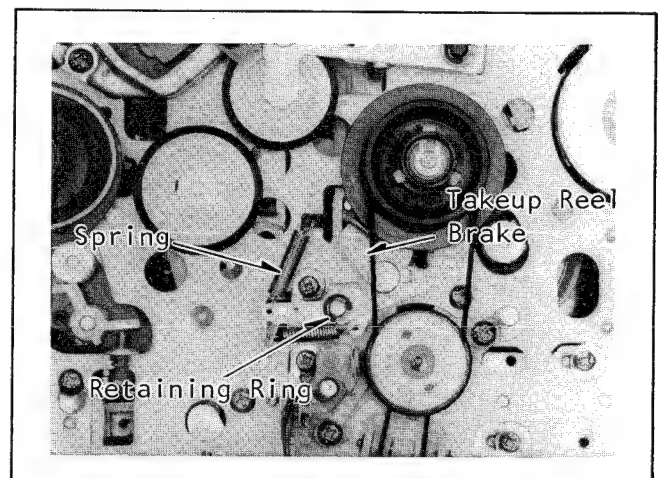


Fig.M97. Replacement of
Takeup Reel Brake

Note: Upon completion of the replacement, "ADJUSTMENT OF CASSETTE COMPARTMENT" should be checked. Refer to its section for details.

26. REPLACEMENT OF FF BRAKE LEVER

Replacement Procedure

1. Remove the Bottom Case, Top Panel and the Cassette Compartment. (Refer to the section of "DIS-ASSEMBLY METHOD", Items 2-1, 2-2 and 2-7).
2. Remove the Tension Arm Unit and the Tension Band Unit. (Refer to the section of "REPLACEMENT OF TENSION ARM AND TENSION BAND").
3. Remove the Spring, Retaining Ring and the FF Brake Lever Unit from the shaft.

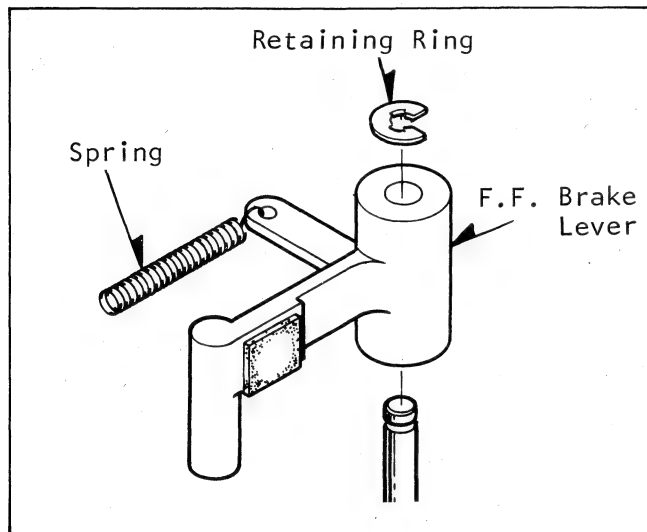


Fig.M98. Replacement of F.F. Brake Lever

4. Install a new one and reverse the above steps to complete the installation.

Note: Upon completion of the replacement, "ADJUSTMENT OF CASSETTE COMPARTMENT" and "POSITION ADJUSTMENT OF TENSION POST" should be checked. Refer to their sections for details.

27. REPLACEMENT OF REWIND ROLLER UNIT

Replacement Procedure

* Equipment Required:

Hex. Wrench 1.5 mm (VFK76)

1. Remove the Bottom Case, Top Panel and Cassette Compartment. And open the Bottom P. C. Board. (Refer to the section of "DIS-ASSEMBLY METHOD", Items 2-1, 2-2, 2-6 and 2-7).
2. Unscrew the Hex. Screw (A) and remove the Rewind Roller Unit.
3. If Rewind Pulley requires replacement, remove it at this time.
4. Install new part and reverse the above steps to complete the installation.

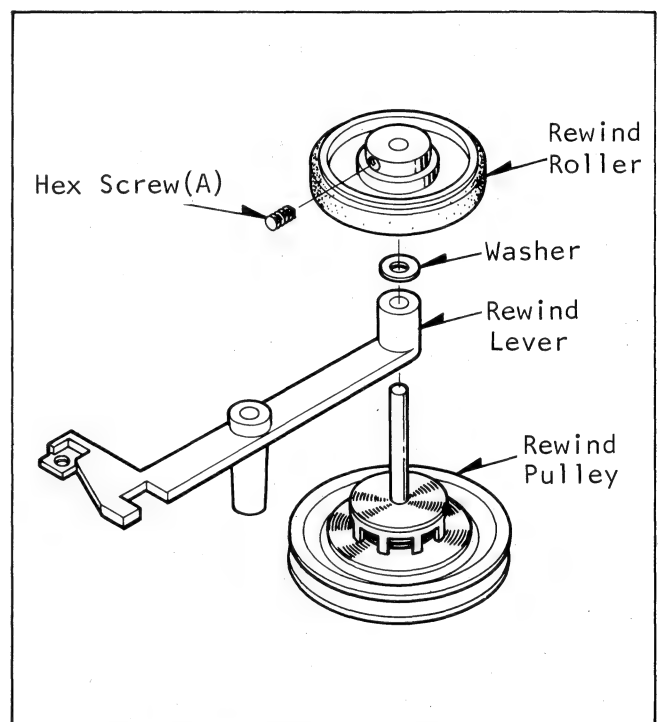

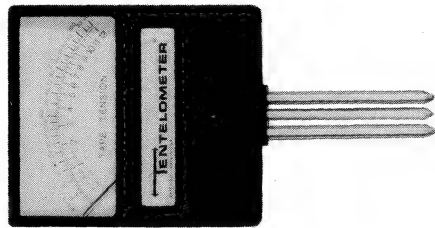
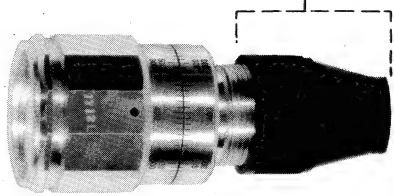
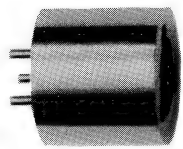


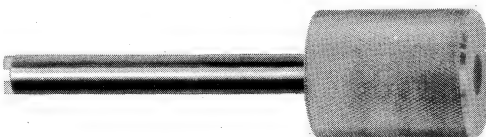
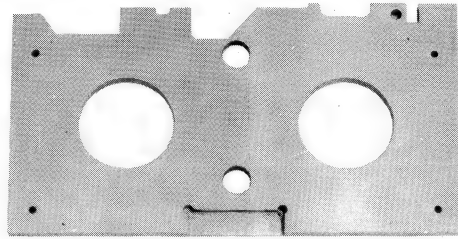
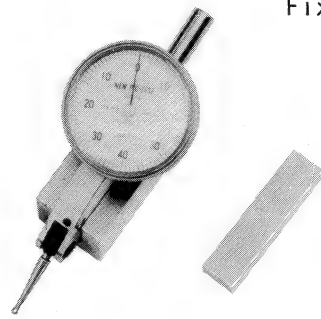
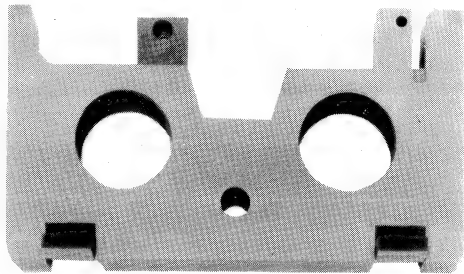
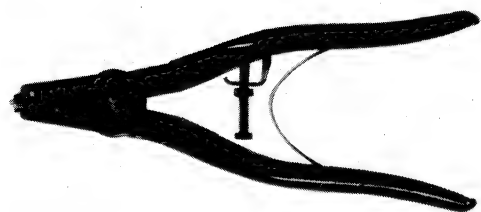
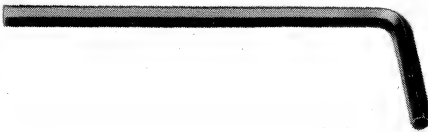
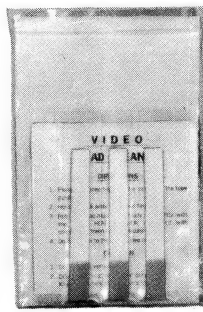
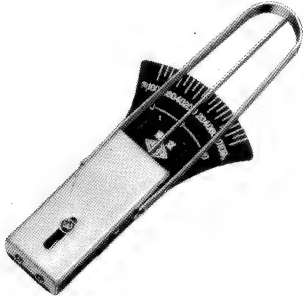
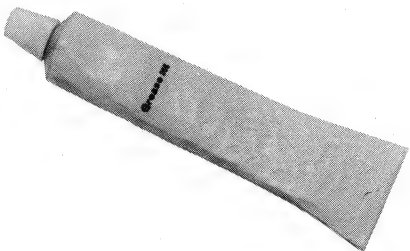
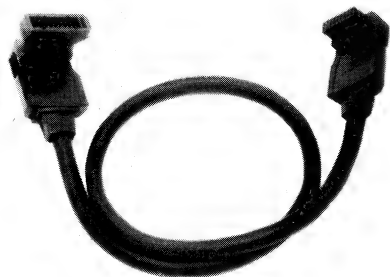

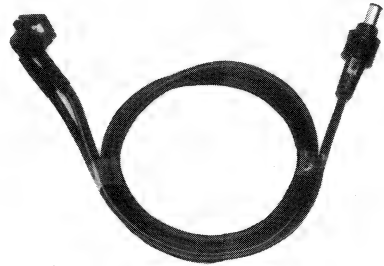


Fig.M99. Replacement of Rewind Roller

Note: Upon completion of replacement, "ADJUSTMENT OF CASSETTE COMPARTMENT" should be checked. Refer to its section for details.

4. Servicing Fixtures & Tools

Servicing Fixtures & Tools					
<p>VFM8080H6 VHS Alignment Tape</p> 	<p>Back Tension Meter (Tentelometer, Made in U.S.A.)</p> 	<p>VFK0133 Dial Torque Gauge VFK0180 (Plastic Clamper Only)</p> 	<p>VFK0134 Adaptor for VFK0133</p> 	<p>VFK0135 Eccentric Screwdriver</p> 	
<p>VFK0136 Fine Adjustment Screwdriver (3mm ϕ) VFK0157 Fine Adjustment Screwdriver (2.2mm ϕ)</p>  <p>A stripe engraved for VFK0157</p>	<p>VFK0137 Post Adjustment Screwdriver</p> 	<p>VFK0138 Post Adjustment Plate</p> 	<p>VFK0139 Reel Table Height Fixture</p> 	<p>VFK0179 Cassette Compartment Fixture</p> 	
<p>VFK0145 Retaining Ring Remover (4mm ϕ)</p> 	<p>VFK0146 Hex. Wrench (0.9mm) VFK76 Hex. Wrench (1.5mm)</p> 	<p>VFK27 Head Cleaning Stick</p> 	<p>VFK66 Fan-type Tension Gauge</p> 	<p>MOR265 Morlytone Grease</p> 	
<p>VJSS0004 Extension Cable (18 Pin to 18 Pin)</p> 	<p>VJAS0002 Extension Cable (Plug to Clips)</p> 	<p>VJAS0003 Extension Cable (Plug to Battery Jack)</p> 			

MEMO

Handwriting practice lines on the left page of a memo template. The page features 25 horizontal dotted lines for writing.

Handwriting practice lines on the right page of a memo template. The page features 25 horizontal dotted lines for writing.

ELECTRICAL ADJUSTMENT PROCEDURES

1. Test Equipment

To make adjustments, the following equipments are required.

1. VTVM (Vacuum Tube Volt Meter)
Voltage Range: 0.001-50V
2. Dual-trace Oscilloscope
Voltage Range: 0.005-50V/div
Frequency Range: DC-10MHz
Probes: 10:1 and 1:1
3. Frequency Counter
Frequency Range: 0-10MHz
4. Signal Generator
Sinewave: 0-10MHz
5. Color Receiver or Monitor
6. Plastic Tip Driver
7. VHS Alignment Tape, VFM8080H6
(See Note.)
8. Sweep Generator
Frequency Range: 0-10MHz
9. Vector Scope

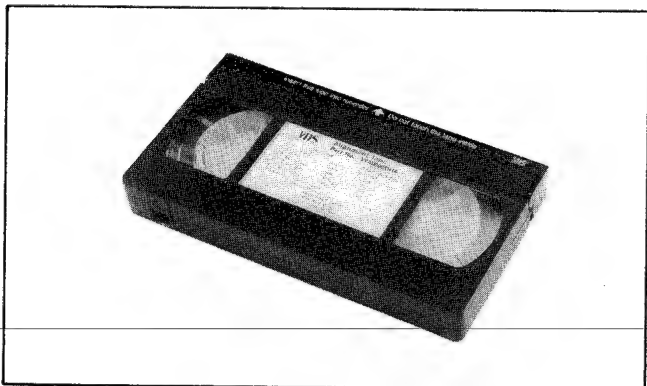


Fig.E1. VHS Alignment Tape VFM8080H6

Note: The VHS alignment Tape, VFM8080H6, contains the following signals.

Start Counter Reading	0	017 ± 4	092 ± 6	130 ± 10
Video	Blank	Monoscope	Color Bars	Multi-Burst
Audio	Blank	6KHz	3KHz	1KHz

Fig.E2. Programs in the Alignment Tape

POWER SUPPLY SECTION (TUNER UNIT)

Before adjusting the Power Supply Circuit, check the AC input voltage for 120VAC and then disconnect the Tuner Unit from the Deck.

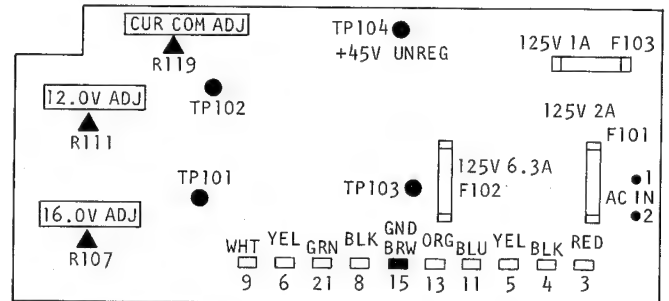


Fig.E3. Fuses, Test Points and Adjustments of the Tuner Unit Power Supply Circuit Board (Viewed from component side)

(1) +16VDC adjustment

Test Point: TP101

Adjustment: +16V ADJ. (R107)

1. Connect the VTVM between TP101 (+) and Pin 15 (-) on the Power Supply Board as shown below.

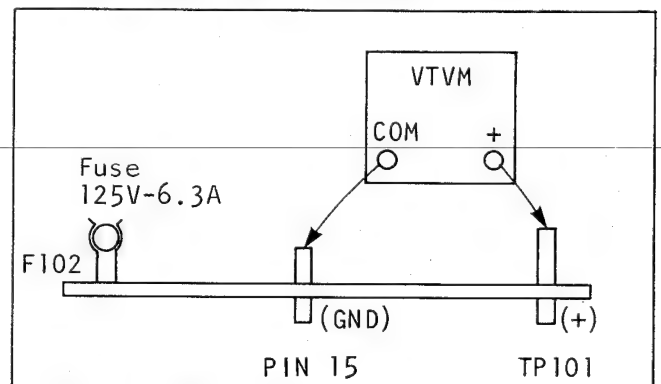


Fig.E4. Power Supply Circuit Board

2. Adjust the +16V ADJ (R107) for $15.5 \pm 0.1V$.

(2) +12VDC Adjustment

Test Point: TP102

Adjustment: +12V ADJ (R111)

1. Connect the VTVM between TP102 (+) and Pin 15 (-) on Power Supply Board as shown below.

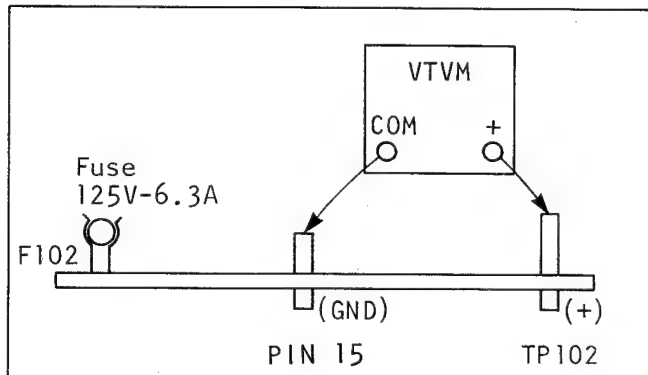


Fig.E5. Power Supply Circuit Board

2. Adjust the +12V ADJ (R111) for $12.0 \pm 0.1V$.

(3) R119 Battery Charge Adjustment

Test Point: TP103

Adjustment: 13.0V ADJ (R119)

1. Connect the VTVM between TP103 (+) and pin 15 (-) on the power supply board.
Confirm 14V DC at TP103. (No battery connected to the power supply.)
2. Adjust R119 fully clock wise.
3. Connect a 100 ohm 5W resistor between TP103 and pin 15 with a pair of alligator clip leads - the VTVM connected as in step 1.
4. Slowly turn R119 counter clockwise until the BATT. CHARGE LED, located on the front panel of the tuner, will light.
5. Confirm that the voltage at TP103 is 13.0V DC.

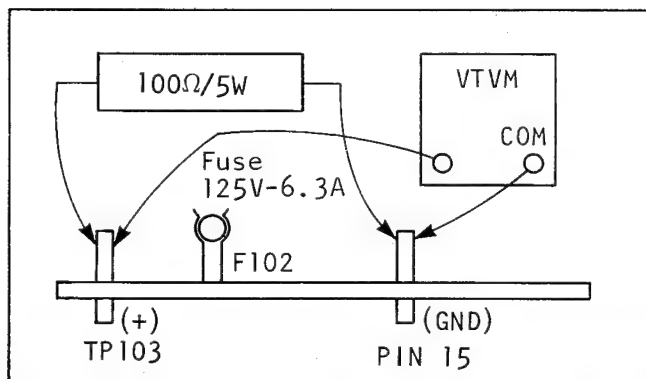


Fig.E6. Power Supply Circuit Board

AVR SECTION

[1-1-1] AVR Circuit Testing and Adjustment

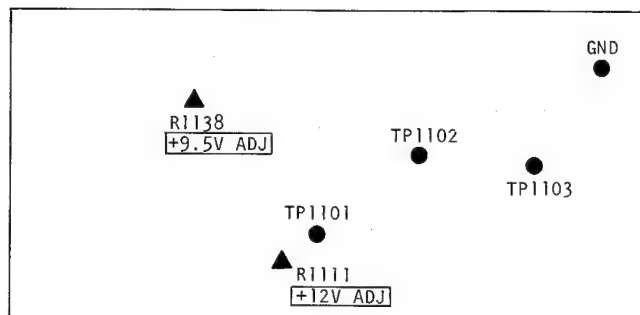


Fig.E7. AVR Circuit Board (Viewed from Component Side)
(This circuit board is located at the rear of deck)

1. Make sure that the resistance between TP1102 and GND is greater than 10 ohm using a volt/ohm meter (x1 range).
2. Connect DC power to the battery terminal and turn the power switch on. If the fuse is blown, locate the cause before supplying power again.
3. In the PLAY MODE with DC $12V \pm 1V$ or TV Demodulator Unit connected, adjust the voltage between TP1102 and GND to $9.5V \pm 0.1V$ by adjusting R1138.
4. Connect DC 10.6V power to the battery terminal and adjust the undercut by R1111 so that the voltage between TP1101 and GND is $0.4V \pm 0.1V$ in the STOP mode.

SERVO, AUDIO, COLOR, VIDEO SECTION

A. ADJUSTMENTS IN THE STOP OR PLAYBACK MODE

2-2-1. 60Hz Reference Oscillation Confirmation Test Point: TP202

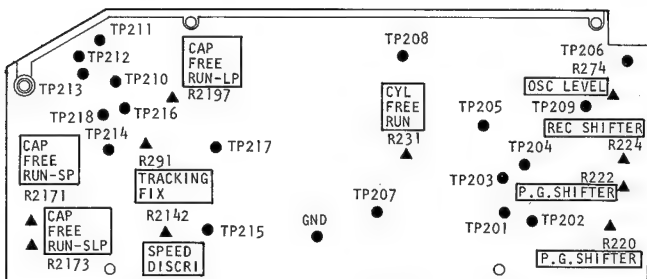


Fig.E8. Servo Circuit Board (This circuit board is located on the right side when viewing the deck from the front)

1. Place the unit in the play mode.
2. Connect the scope to TP202 on the Servo board.
3. Confirm that the T portion of waveform is 16.6 msec.
4. If not, be sure item 2-4-10 is adjusted correctly.

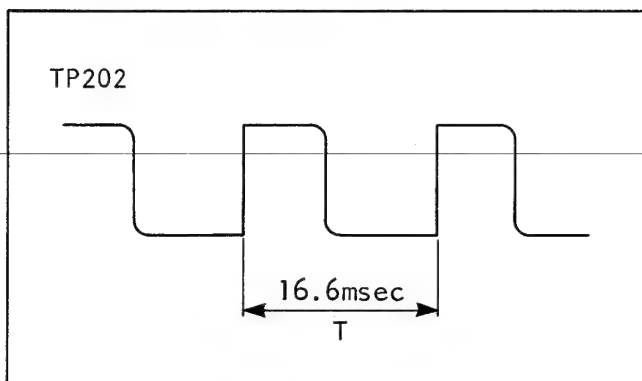


Fig.E9. 60Hz Square Waveform

2-2-2. Switching Flip-Flop Duty Cycle Adjustment

Test Points: TP509, TP511, TP312, TP314

Adjustments: R220 (PG SHIFTER ADJ)
R222 (PG SHIFTER ADJ)

Note: For video test point locations refer to items 2-4-1 and 2-4-3.

1. Connect the jumper between TP509 and TP511 on the Head Amp board.
2. Connect the scope CH1 to TP312 and CH2 TP314 on the Video Process board. Use CH1 to trigger the scope.
3. Play back the monoscope section of the alignment tape VFM8080H6 and set the scope to the CHOP mode. Then expand the switching portion of the envelope.

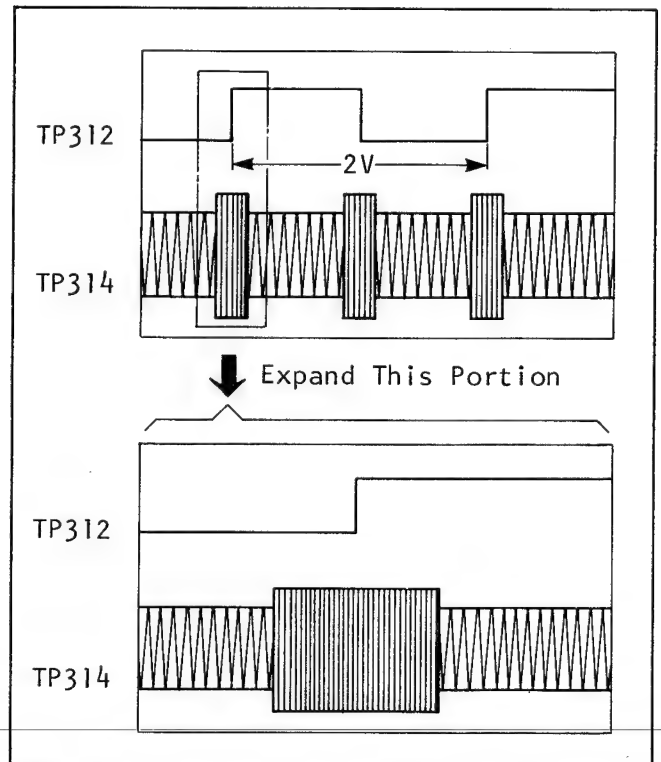


Fig.E10. Relationship between Head Switch Pulse and RF Envelope

4. Now adjust PG SHIFTER ADJ (R222) on the Servo board to place the rising edge of the switching pulse in the center of the overlapped RF envelope.

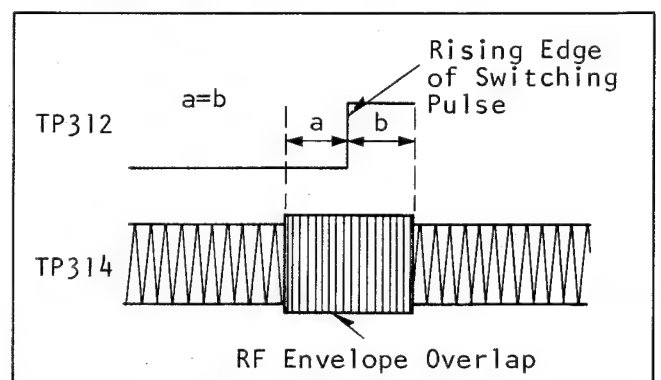


Fig.E11. Switching Position

5. Then adjust PG SHIFTER ADJ (R220) on the Servo board to place the falling edge of the switching pulse in the center of the overlapped RF envelope.

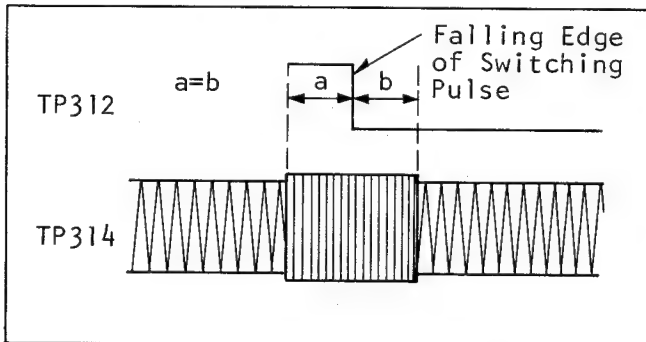


Fig.E12. Switching Position

6. Fine adjust R220 or R222 so that the difference between leading edge and trailing edge is as shown below.
Switch the slope selector on the scope to either + (plus) or - (minus) and confirm if fine adjustment is required.

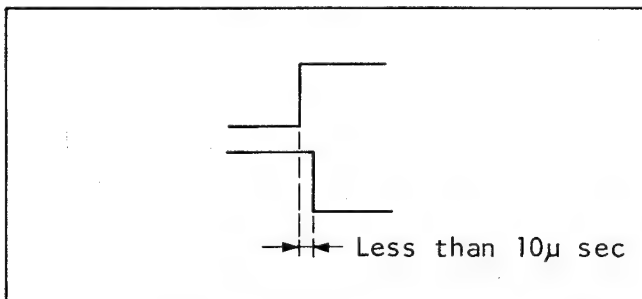


Fig.E13. Head Switching Pulse Fine Adj.

7. Remove the jumper.

2-2-3. Control Head Output Confirmation

Test Point: TP210

1. Connect the scope to TP210 on the Servo board.
2. Play back to monoscope section of the alignment tape VFM8080H6.
3. Make sure that the level of positive pulses is greater than 1.2V.

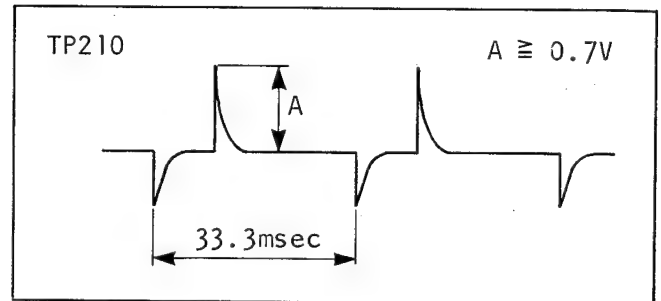


Fig.E14. Control Head Output

2-2-4. Tracking Fix Adjustment

Test Points: TP203, TP211

Adjustment: R291 (TRACKING FIX ADJ)

1. Supply a video signal to the Video Input on the rear panel or tune in a local on-air TV program. Place the select switch in the Tuner or Line position.
2. Insert a cassette and make a recording in the SP mode for a few minutes.
3. Set the Tracking Control on the front panel to the center detent position. Connect the scope CH1 to TP203 and CH2 to TP211 on the Servo board and expand its sweep. Use CH1 to trigger the scope.
4. Play back the portion just recorded.
5. During playback, adjust the TRACKING FIX ADJ R291 so the phase relationship between TP203 and TP211 is as shown below.

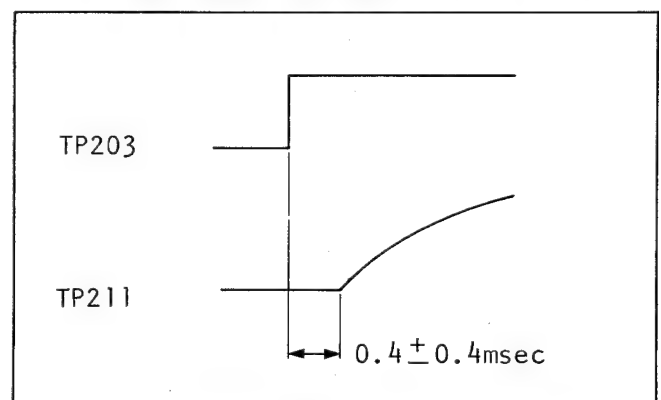


Fig.E15. Phase Relationship Between TP203 and TP211

2-2-5. P.G. Head Output Confirmation

Test Point: TP206

1. Play back the monoscope section of alignment tape VFM8080H6.
2. Connect the scope to TP206.
3. Confirm that the level is as shown in Fig.E16.

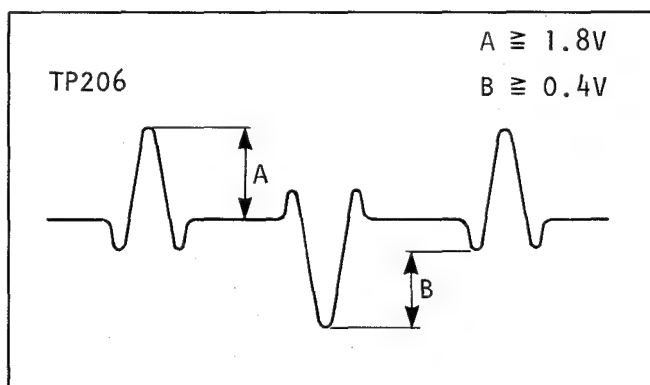


Fig.E16. P.G. Head Output

2-2-6. Oscillation Amplitude Adjustment for DD Cylinder

Test Point: TP208

Adjustment: R274 (OSC LEVEL ADJ)

1. Insert a cassette and place the unit in PLAY REC mode.
2. Connect the scope to TP208.
3. Adjust the OSC LEVEL ADJ (R274) on the same board so the A portion of the waveform is 0.33 ± 0.02 Vp-p.

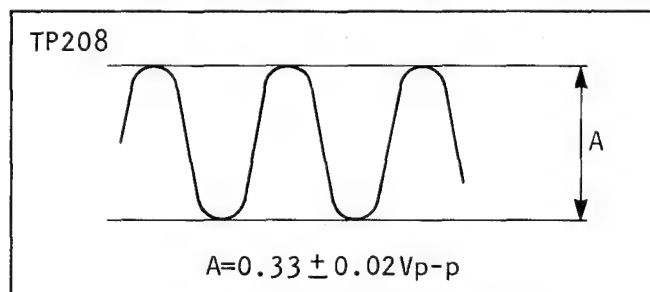


Fig.E17. Waveform at TP208

2-2-7. Speed Distinction Circuit Adjustment

Test Points: TP215, TP216, TP217, TP218

Adjustment : R2142

1. Connect the VTVM to TP215.
2. Play back the SP recorded tape.
3. Adjust R2142 on the Servo board so the level is 4.0 ± 0.1 V at the TP215.
4. Then, supply a monoscope signal to the Video Input on the rear Panel.
5. Place the unit in each mode and make a recording.
6. Connect the VTVM to TP216 and TP217. Connect the frequency counter to TP218.
7. Confirm that the levels and frequencies are as show in Fig.E18.

Mode \ Test Point	TP216	TP217	TP218
Play back the SP recorded portion	(L)	(L)	
Play back the LP recorded portion	(H)	(L)	
Record in SLP mode	(H)	(H)	
Play back the SLP recorded portion	(H)	(H)	
Pause during SLP play back			440 ± 15 Hz
During loading			440 ± 80 Hz
F.F. REW			924 ± 100 Hz

Fig.E18.

B. ADJUSTMENTS IN THE RECORD MODE

2-2-8. Capstan FG Output Confirmation

Test Point: Pin 16 (IC203) or TP218

1. Supply a video signal to the Video Input on the rear panel or tune in a local on-air TV program. Place the select switch in the Tuner or Line position.
2. Insert a cassette and make a recording in the SLP mode.
3. Connect the scope to IC203, Pin 16 or TP218.
4. Confirm that level A is 200-500 mVp-p.

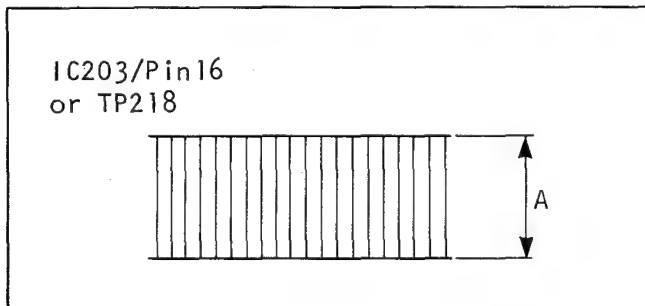


Fig.E19. Capstan FG output

2-2-9. Cylinder Servo Sampling Gate Adjustment

Test Points: TP203, TP204, TP205

Adjustment: R231 (CYLINDER FREE RUN ADJ)

1. Supply a video signal to the Video Input on the rear panel or tune in a local on-air TV program. Place the select switch in the Tuner or Line position.
2. Insert a cassette and make a recording.
3. Connect the scope CH1 to TP204 and CH2 to TP203 on the servo board. Set the scope to the CHOP mode.
4. Pre-adjust the CYLINDER FREE RUN ADJ (R231) on the same board so the two waveforms are locked.

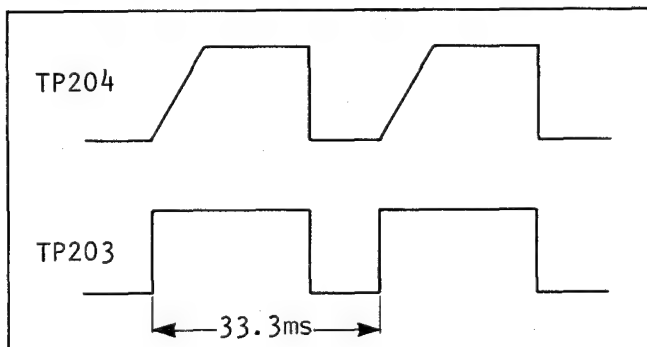


Fig.E20. Cylinder Servo Sampling Gate

5. Connect the VTVM to TP205 on the same board.

6. Adjust the CYLINDER FREE RUN ADJ (R231) so the voltage is $4 \pm 0.2\text{VDC}$.

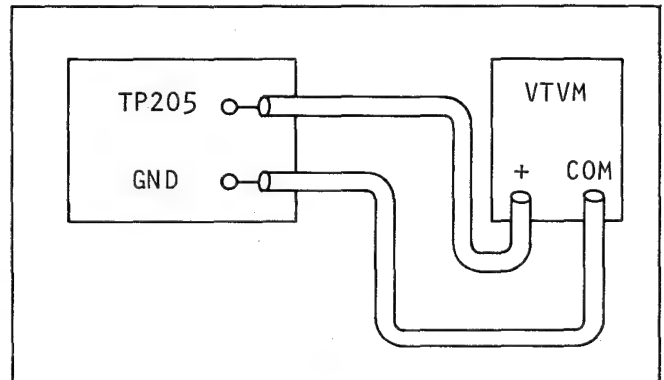


Fig.E21.

2-2-10. Capstan Servo Sampling Gate Adjustment

Test Points: TP212, TP213, TP214

Adjustments: R2171 (SP Mode)
(CAP FREE RUN - SP ADJ)
R2197 (LP Mode)
(CAP FREE RUN - LP ADJ)
R2173 (SLP Mode)
(CAP FREE RUN - SLP ADJ)

1. Supply a video signal to Video Input on the rear panel or tune in a local on-air TV program. Place the select switch in the Tuner or Line position.
2. Place the unit in SP mode and make a recording.
3. Connect the scope CH1 to TP212 and CH2 to TP213 on the servo board. Set the scope to the ADD mode.
4. Pre-adjust the CAP FREE RUN-SP ADJ (R2171) on the same board so the sampling pulse is locked on the rising slope of the trapezoidal waveform.

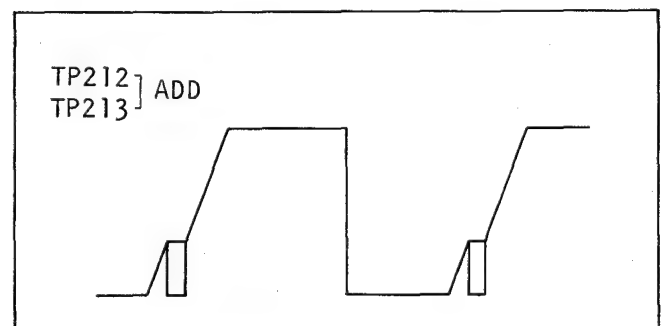


Fig.E22. Capstan Servo Sampling Gate

5. Connect the VTVM to TP214 on the same board.

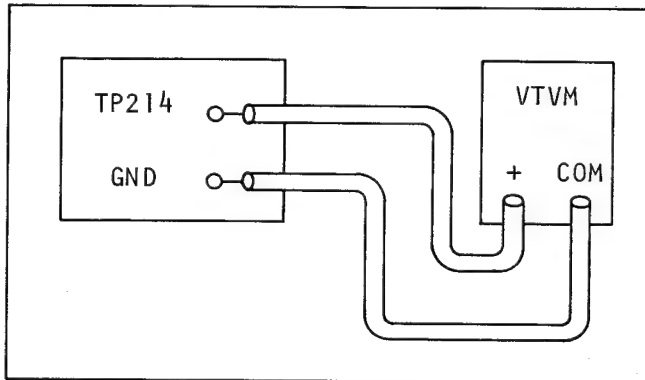


Fig.E23.

6. Adjust the CAP FREE RUN - SP (R2171) so the voltage is 4 ± 0.3 VDC.
7. Then switch to LP mode.
Pre-adjust the CAP FREE RUN - LP (R2197) on the same board in the LP RECORD mode.
8. Adjust the CAP FREE RUN - LP (R2197) so the voltage is 4 ± 0.3 VDC.
9. Then switch to SLP mode.
Pre-adjust the CAP FREE RUN - SLP (R2173) on the same board in the SLP mode.
10. Adjust the CAP FREE RUN - SLP (R2173) so the voltage is 4 ± 0.3 VDC.

2-2-11. Head Switching Position

Adjustment

Test Points: TP203, TP301

Adjustment: R224 (REC SHIFTER ADJ)

1. Supply a video signal to the Video Input on the rear panel or tune in a local on-air TV program. Place the select switch in the Tuner or Line position.
2. Insert a cassette and make a recording.
3. Connect the scope CH1 to TP203 and CH2 to TP302 on the Video Process board.
Set the scope to CHOP mode.
4. Also set the scope to the Delay mode or expand the vertical interval of the signal from TP302.
5. While recording, adjust the REC SHIFTER (R224) so the recording head switching point is $6 \pm 1H$ before the start of vertical sync as shown in Fig.E24.

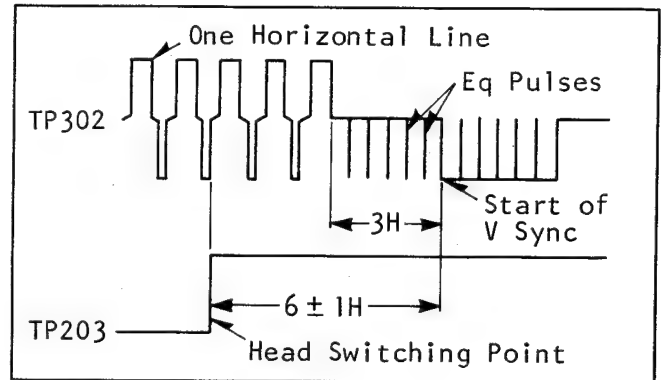


Fig.E24.

6. Change the slope selector of the scope from "+" to "-" and make sure that the other switching point is also $6 \pm 1H$ before the beginning of vertical sync.
If the tolerance is more or less than $6 \pm 1H$, readjust the switching Flip-Flop Duty Cycle (Refer to Item 2-2-2).

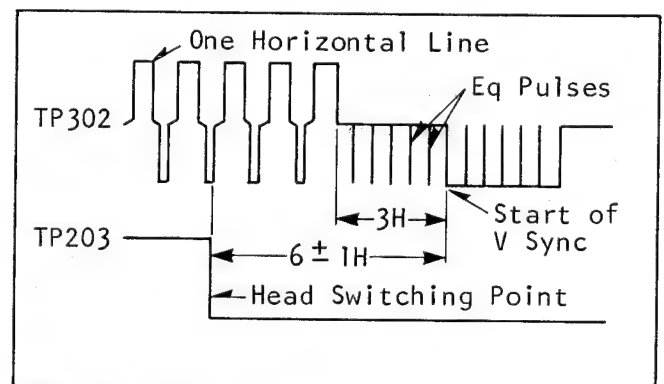


Fig.E25. Head Switching Point-2

2-2-12. LP/SP Voltage Confirmation

Test Point: TP217

1. Supply a video signal to the Video Input on the rear panel or tune in a local on-air TV program. Place the selector switch in the Tuner or Line Position.
2. Insert a cassette and make a recording in the SP mode for a few minutes.
3. Play back the portion just recorded.
4. Connect the VTVM to TP217.
5. Confirm that the voltage is more than 6.7 VDC.

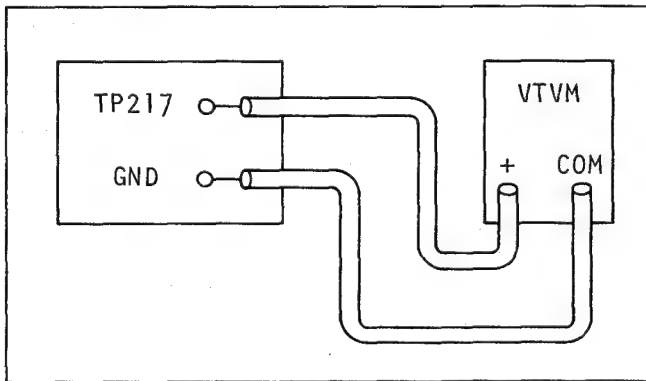


Fig.E26.

2-3. AUDIO SECTION

Audio adjustment procedures consist of two parts.

- A. Adjustments in Record mode.
- B. Adjustments in Playback mode.

A. ADJUSTMENT IN RECORD MODE

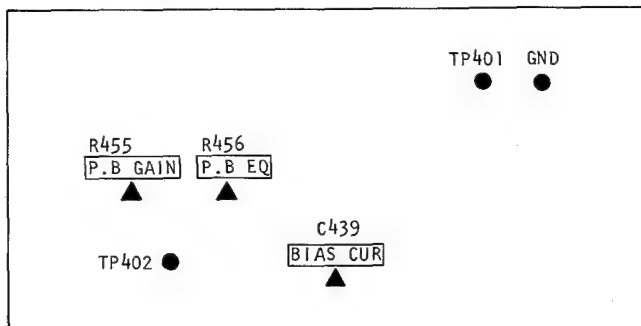


Fig.E27. Audio Circuit Board
(This circuit board is located on the rear of the deck)

2-3-1. AGC Confirmation

Test Point: TP401

1. Supply a sinewave signal (1KHz, -20dB) to the Audio Input on the rear panel and set the Input Selector on the front panel to the LINE position.
2. Insert a cassette and make a recording in the SP mode.
3. Connect the scope to TP401 on the Audio board.
4. Confirm that the audio level is $1.5 \pm 0.2V_{p-p}$.
5. Change the input signal level from -20dB to -10dB and confirm the audio output level is $1.6 \pm 0.2V_{p-p}$.

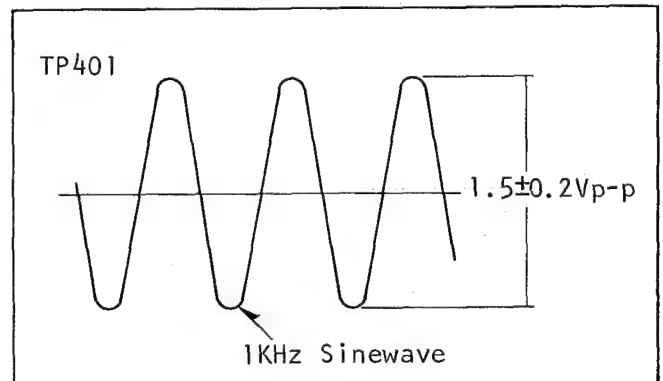


Fig.E28. Waveform at TP401

2-3-2. Bias Current/Dummy Coil Adjustments

A. Bias Current Adjustment

Test Point: Audio Head Terminal

Adjustment: C439 (BIAS CUR ADJ)

1. Do not connect any audio signal to the Audio Input on the rear panel and set the Input selector on the front panel to the LINE position.
2. Insert a cassette and make a recording in the SP mode.
3. Connect the VTVM as shown below.

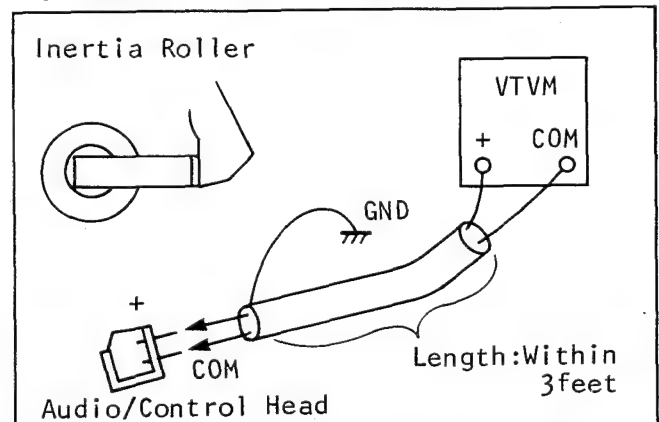


Fig.E29.

4. While the recording is taking place, adjust the BIAS CUR ADJ (C439) on the Audio board so that the Audio Head output is 1.20 ± 0.05 mV rms.

B. Dummy Coil Adjustment

1. Play back a pre-recorded tape.
(Since the Audio signal recorded on the tape will be erased under the following procedure, be sure to use the tape whose audio is allowed to be erased.)
2. Connect a VTVM as indicated by Fig. E29 item 3 of A (Bias Current Adjustment).
And make an audio dubbing by pressing the Audio Dubbing Button and Playback Button.
3. Adjust the DUMMY COIL (L407) on the Audio board so the Audio Head output is 1.2 ± 0.05 mV rms.

2-3-3. Playback Gain Adjustment

Test Point: TP401

Adjustment: R455 (P.B. GAIN)
R456 (P.B. EQ)

1. Supply the sinewave signal (1kHz and 5kHz, -30dB) to the Audio input on the rear panel.
2. Connect the VTVM to TP401 on the Audio board.
3. Insert the cassette and make a recording 1kHz first then 5kHz signal in the SP mode.
4. Play back the portion just recorded.
5. Adjust the P.B. GAIN (R455) so the voltage of 1kHz at recording and playback voltage of 1kHz are equal.
6. Adjust the P.B. EQ. (R456) so the 1kHz and 5kHz outputs are balanced.

2-4. VIDEO SECTION

2-4-1. Head Amp Peak Frequency Adjustment

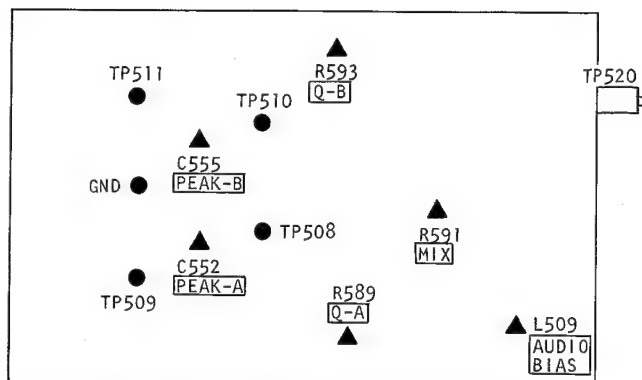


Fig.E30. Head Amp Circuit Board
(This circuit board is located on the top side of the deck)

A. Factory Adjustment

Test Point: TP322

Adjustments: C552 (PEAK-A ADJ)
C555 (PEAK-B ADJ)

1. Do not supply any video or RF signal to the rear panel.
2. Turn the DOC LEVEL ADJ (R3188) to fully clockwise.
3. Connect the sweep generator to TP313 on the Video Process Board.
4. Turn controls as follows (All controls are on the Head Amp Board.)
R589 (Q-A ADJ) Fully Counter-clockwise
R593 (Q-B ADJ) Fully Clockwise
R591 (MIX) Center
5. Connect the scope to TP322.
6. Blind the supply photo transistor by black tape and place the unit in the PLAY mode without a tape.
7. Adjust the level of sweep generator to $400\text{mVp-p} \pm 100\text{mVp-p}$ at TP322.
8. Adjust the PEAK-A ADJ (C552) and PEAK-B ADJ (C555) so the peak on the scope is 4.7MHz.

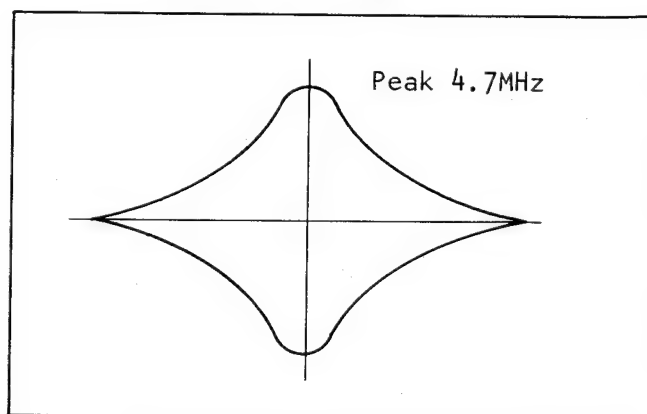


Fig.E31. Peak Frequency

B. Field Adjustment

1. Do not supply any video or RF signal to the rear panel.
2. Connect a signal generator (sine-wave) to TP508 and TP510, on the Head Amp board through 39K ohm resistors.

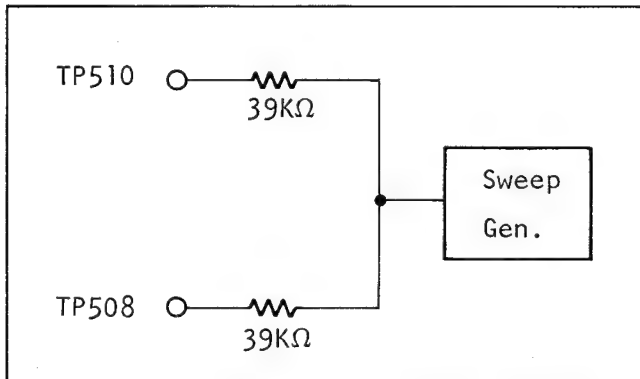


Fig.E32. Connection of Sweep Generator

3. Same as factory adjustment.
4. Connect the scope to TP322.
5. Blind the supply photo transistors by black tape, and place the unit in the PLAY mode without a tape.
6. Adjust the level of the signal generator to 400mVp-p \pm 100mVp-p.
7. Adjust the PEAK-A ADJ (C552) and PEAK-B ADJ (C555) so the peaks on the scope are 4.7MHz.

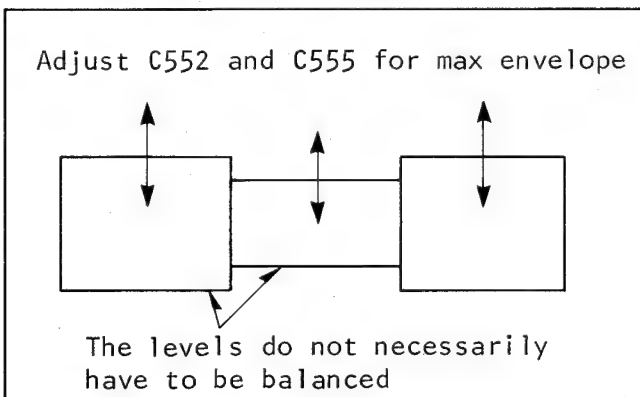


Fig.E33. Peak Frequency

2-4-2. Head Amp Frequency Response and Balance Adjustment

Test Point: TP322

Adjustment: R589 (Q-A ADJ)
R593 (Q-B ADJ)
R591 (MIX)

1. Supply V sync to the Video Input on the rear panel from a sweep generator.

2. Connect a jumper between TP306 and GND.
3. Connect the sweep generator to TP307.
Put the marker on 2MHz, 3.4MHz and 4.5MHz.
4. Connect the jumper between TP812 and GND.
5. Connect the scope between TP510 (HOT) and TP511 (GND).
6. Insert a cassette tape and place the unit in the REC/PLAY mode.
7. Adjust the level of sweep generator to 12mAp-p. (120mVp-p) at 3.4MHz.

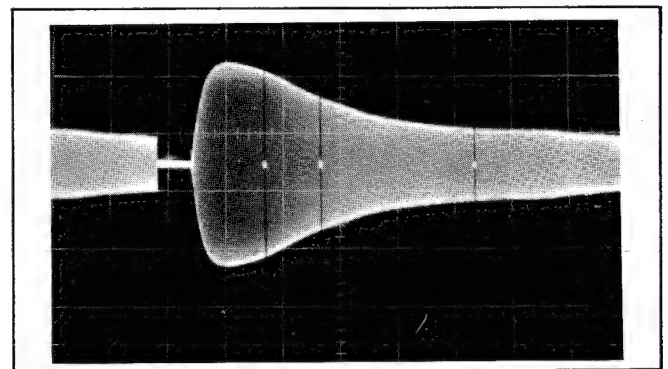


Fig.E34.

8. Make a recording for a few minutes.
9. Play back the portion just recorded.
10. Connect a scope to TP322.
11. Set the DOC LEVEL ADJ (R3188) at center portion.
12. Connect the jumper between TP508 and GND.
13. Adjust the Q-A ADJ (R589) so the level around 2.5 ~ 4.5MHz is as possible as flat.
14. Remove the jumper from TP508.
15. Connect the jumper between TP510 and GND.
16. Adjust the Q-B ADJ (R593) so the level around 2.5 ~ 4.5MHz is as possible as flat.
17. Remove the jumper from TP510.
18. Adjust the MIX ADJ (R591) so the both channel outputs are balanced.

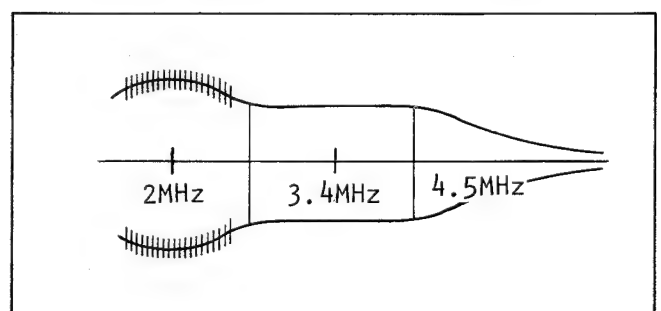


Fig.E35

2-4-3. E-E Level Adjustment

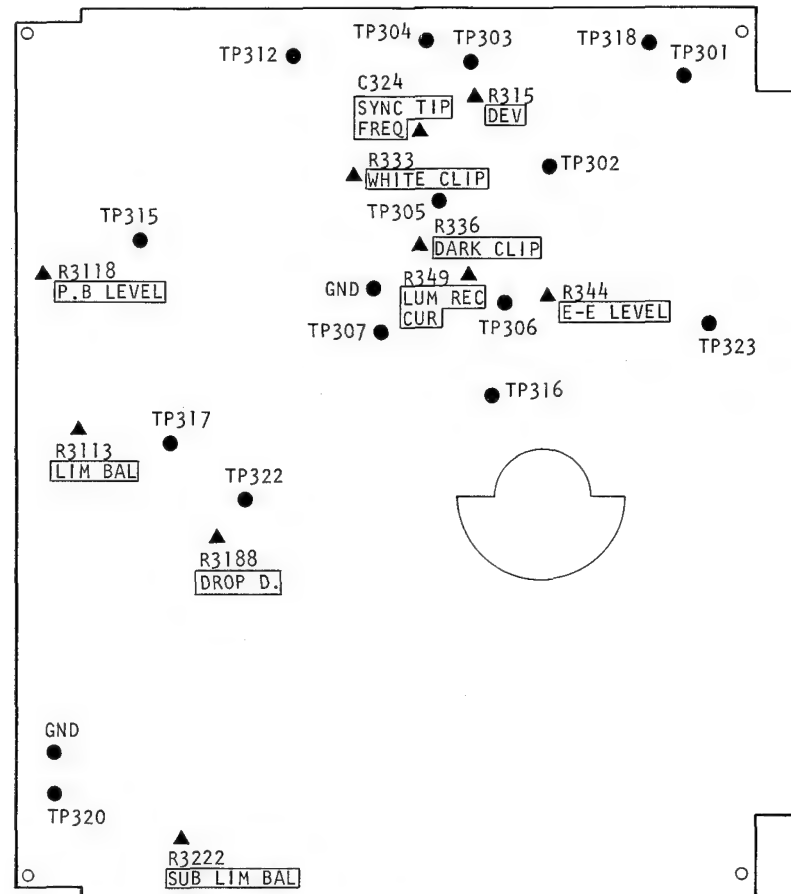


Fig.E36. Video Process Board-Luminance Section(This circuit board is located on the bottom of the deck.)

Test Point: TP317

Adjustment: R344 (E-E LEVEL ADJ)

1. Supply a video signal to Video Input on the rear panel or tune in a local on-air TV program. Place the selector switch in the Tuner or Line Position.
2. Connect the scope to TP317.
3. Insert a cassette tape and press the Record button to place the deck into E-E mode.
4. Adjust the E-E LEVEL ADJ (R344) on the Video Process Board so the video level is $2.0 \pm 0.1V_{p-p}$.

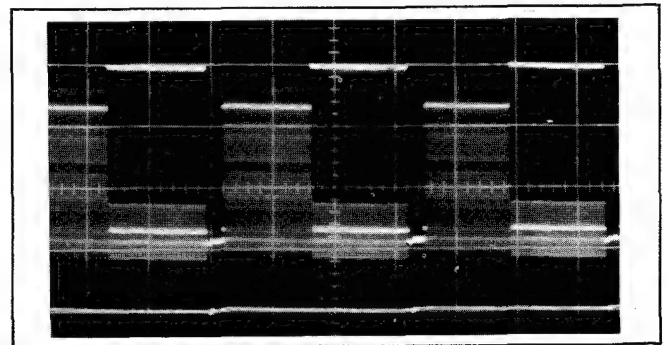


Fig.E37.

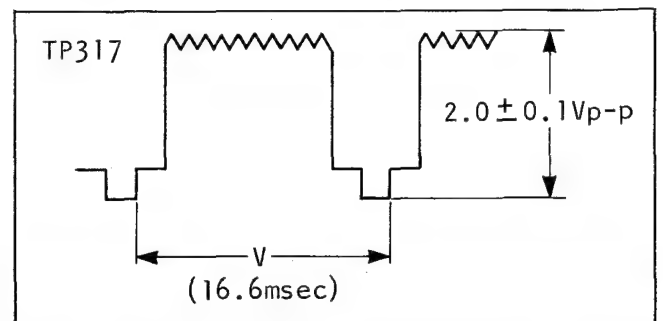


Fig.E38. E.E. Video Level

2-4-4. Video Head Equalization Confirmation Test Point: TP317

1. Supply a multiburst signal to the Video Input on the rear panel.
2. Connect the scope to TP317.
3. Record the multiburst signal for a few minutes in SP mode.
4. Play back the portion just recorded.
5. Confirm that the levels are as shown below.

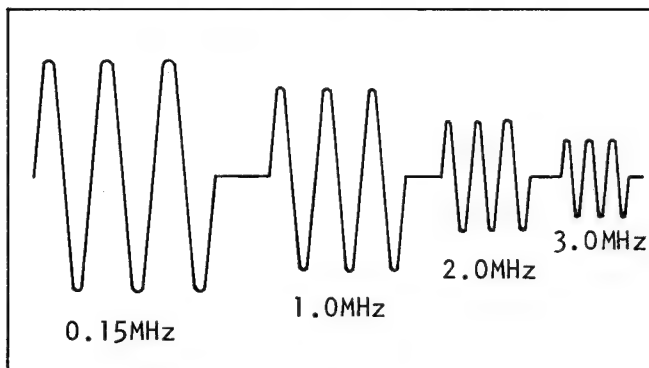


Fig.E39.

Speed	Mode	0.15MHz	1.0MHz	2.0MHz	3.0MHz
6 Hr	Color	0 dB	-1 ± 3 dB	-7 ± 4 dB	-20 ± 8 dB

Fig.E40.

2-4-5. Sync Tip Frequency and Deviation Adjustments

Test Point: TP315

Adjustments: C324 (SYNC TIP FREQ ADJ)
R315 (DEV ADJ)

Before proceduring the following adjustments, several adjustment connections are required.

- a. Connect a jumper between pins 4 and 5 of connector P34 on the Video Process board in order to keep the modulator and demodulator turned on the all times.
- b. Connect a 1K ohm resistor and 0.01 μ F (or 0.047 μ F) capacitor, in series between TP306 and TP322 on the Video Process board. This will feed the modulator output to the demodulator input.

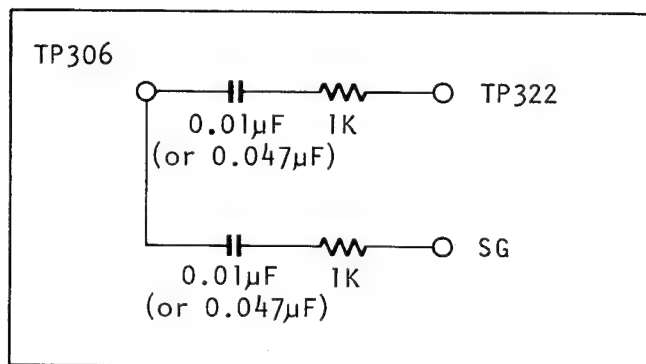


Fig.E41.

- c. Connect a jumper between TP812 and GND.
 - d. Connect a signal generator (sine-wave) to TP306 through a 1K ohm resistor and a 0.01 μ F (or 0.047 μ F) capacitor.
1. Prior to this adjustment, turn the WHITE CLIP ADJ (R333) fully CW and DARK CLIP ADJ (R336) fully CW.
 2. Supply a Color bar signal to the Video Input on the rear panel.
 3. Connect the scope to TP315 on the same board.
 4. Set the signal generator frequency to 3.4MHz \pm 30kHz.
 5. Insert the cassette tape and place the unit in the SP RECORD mode.
 6. Adjust the SYNC TIP FREQ ADJ (C324) for minimum carrier at sync tips.

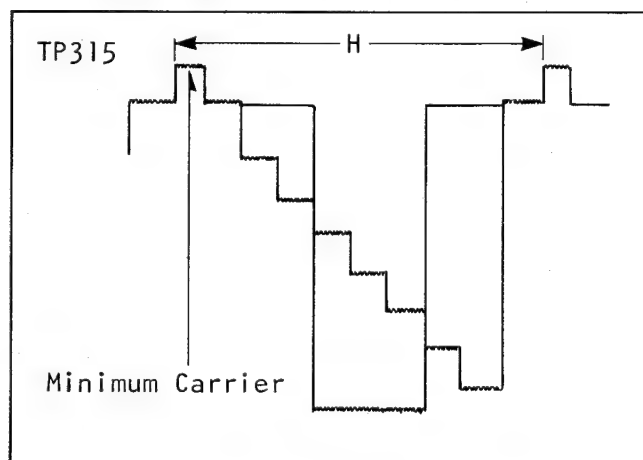


Fig.E42. Sync Tip Frequency

7. Change the frequency of the signal generator from 3.4MHz to 4.35MHz \pm 30KHz.
8. Adjust the DEV ADJ (R315) for minimum carrier at peak white.
9. Remove the jumpers.

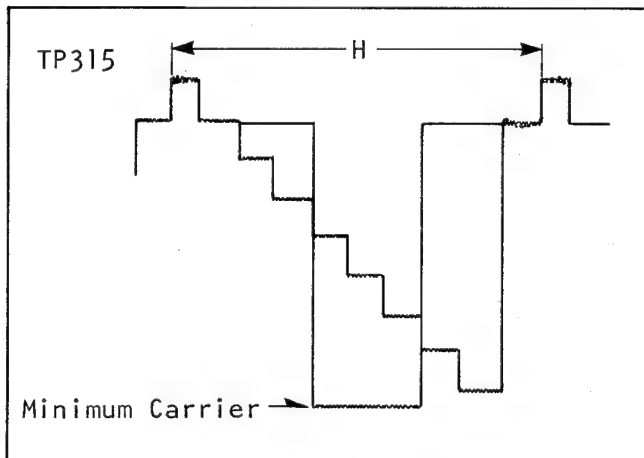


Fig.E43. White Peak Frequency

2-4-5. White and Dark Clip Adjustment
Test Point: TP305

Adjustments: DARK CLIP ADJ (R336)
WHITE CLIP ADJ (R333)

1. Supply a color bar signal to the Video Input on the rear panel.
2. Connect the scope to TP305 on the Video Process board.
3. Place the unit in the SLP RECORD mode.
4. Adjust the WHITE CLIP ADJ (R333) and DARK CLIP ADJ (R336) on the same board so the overshoot and undershoot are as shown below.

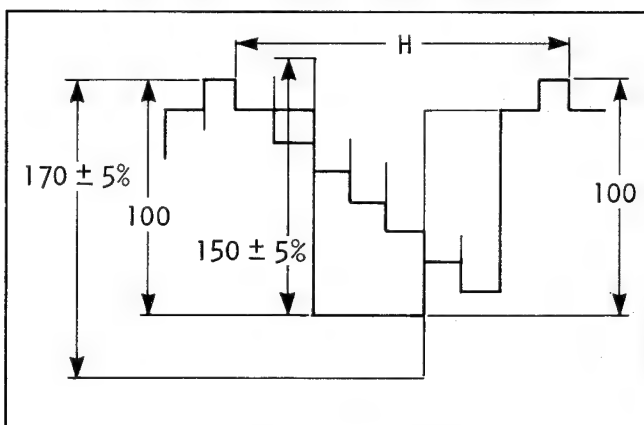


Fig.E44. White and Dark Clip

5. Place the unit in the SP and LP RECORD mode.
6. Confirm that the white clip point is $170 \pm 5\%$.

2-4-6. Recording Current Adjustment
Test Points: TP510, TP511

Adjustments:

R349 (LUMINANCE REC. CUR. ADJ.)
R808 (CHROMA REC. CUR. ADJ.)

1. Supply a color bar signal to the Video Input on the rear panel.
2. Insert a cassette and make a recording in SP mode.
3. Connect the scope between TP510 (Hot) and TP511 (Ground) on the Head Amp board.
4. Turn the REC. CUR. ADJ. (R349) fully counterclockwise.
5. Adjust the CHROMA REC. CUR. ADJ. (R808) on the Video Process board so the level of the cyan portion is $32 \pm 1\text{mVp-p}$.

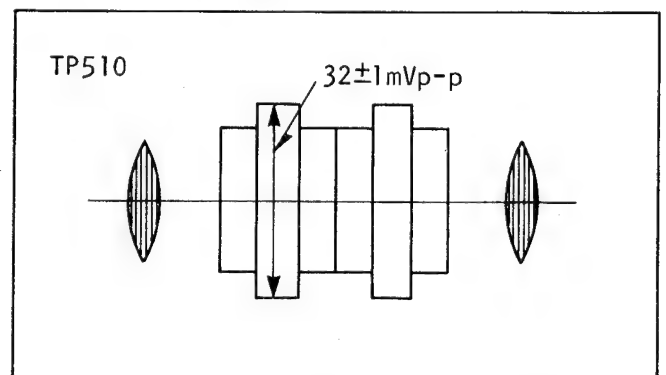


Fig.E45. Chroma Record Current

6. Then slowly turn the REC CUR ADJ (R349) on the same board so that the V sync portion on the envelope at TP510 is $130 \pm 5\text{mVp-p}$.

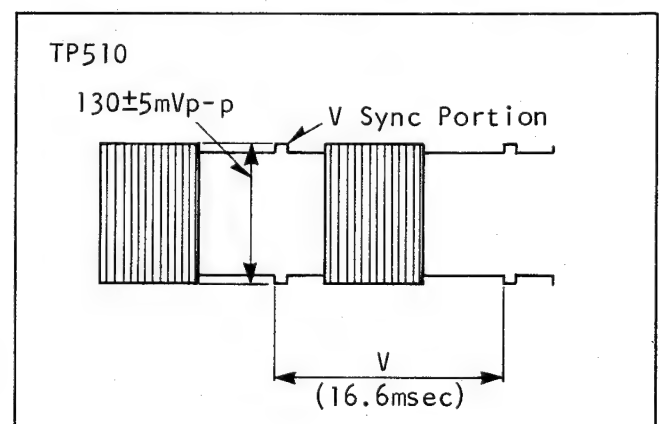


Fig.E46. Luminance Record Current

2-4-7. Dropout Detector Input Level

Adjustment

Test Point: TP314

Adjustment: R3188 (DROP D INPUT ADJ)

1. Supply a video signal to the Video Input on the rear panel or tune in a local on-air TV program. Place the selector switch in the Tuner or Line position.
2. Insert a cassette and make a recording in each mode (SP, LP and SLP) for a few minutes.
3. Play back the portion just recorded.
4. Connect the scope to TP314 on the Video Process board.
5. Adjust the DROP D INPUT ADJ (R3188) so the levels are as follows.

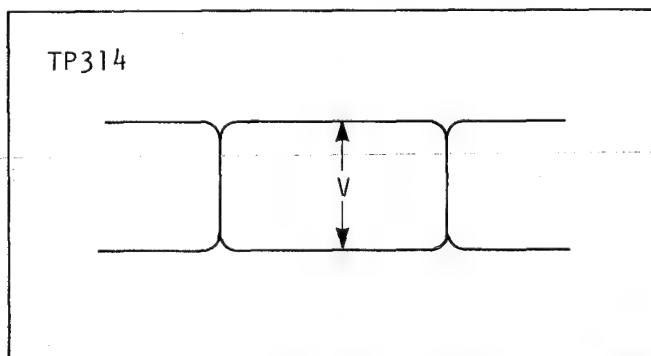


Fig.E47. RF Signal

Mode	Level (V)
SP Mode	$1.0 \pm 0.1V$
LP Mode	more than 0.6V
SLP Mode	more than 0.4V

Fig.E48.

2-4-8. Limiter Balance Adjustment

Test Point: TP315

Adjustment: R3113 (LIM BAL ADJ)

1. Supply a stairstep signal to the Video Input on the rear panel or tune in a local on-air B/W TV program.
2. Place the unit in the SP mode and make a recording for a few minutes.
3. Play back the portion just recorded.
4. Connect the scope to TP315 on the Video Process board.
5. During playback, adjust the LIM BAL ADJ (R3113) on the same board so the carrier at sync tips is minimum at TP315.

6. Connect the jumper between TP320 and GND.
7. During playback adjust the SUB LIM BAL (R3222) on the same board so the carrier at sync tip is minimum at TP315.

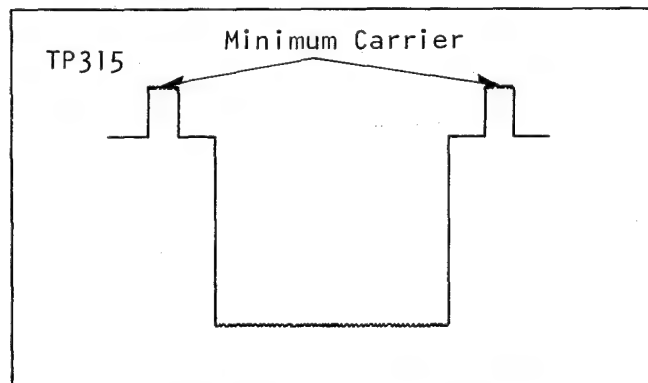


Fig.E49. Limiter Balance

2-4-9. Buffer OSC Frequency Adjustment

Test Point: TP201

Adjustment: R8217

1. Do not supply a video signal or RF signal to the rear panel.
2. Connect the scope to TP201 on the Servo Board.
3. Place the unit in the Record mode and adjust the BUFFER OSC ADJ (R8217) so the "T" is 17.5 ± 0.25 msec.
4. Supply a video signal to video input on the rear panel, or tune in a local on-air TV program.
5. Confirm that "T" is 16.67 msc.

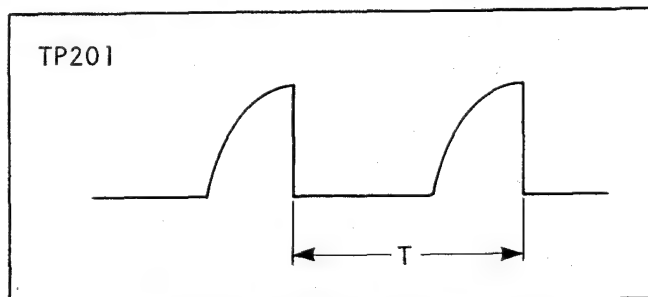


Fig.E50. Buffer OSC Frequency

2-4-10. 3.58MHz Crystal Oscillator Adjustment

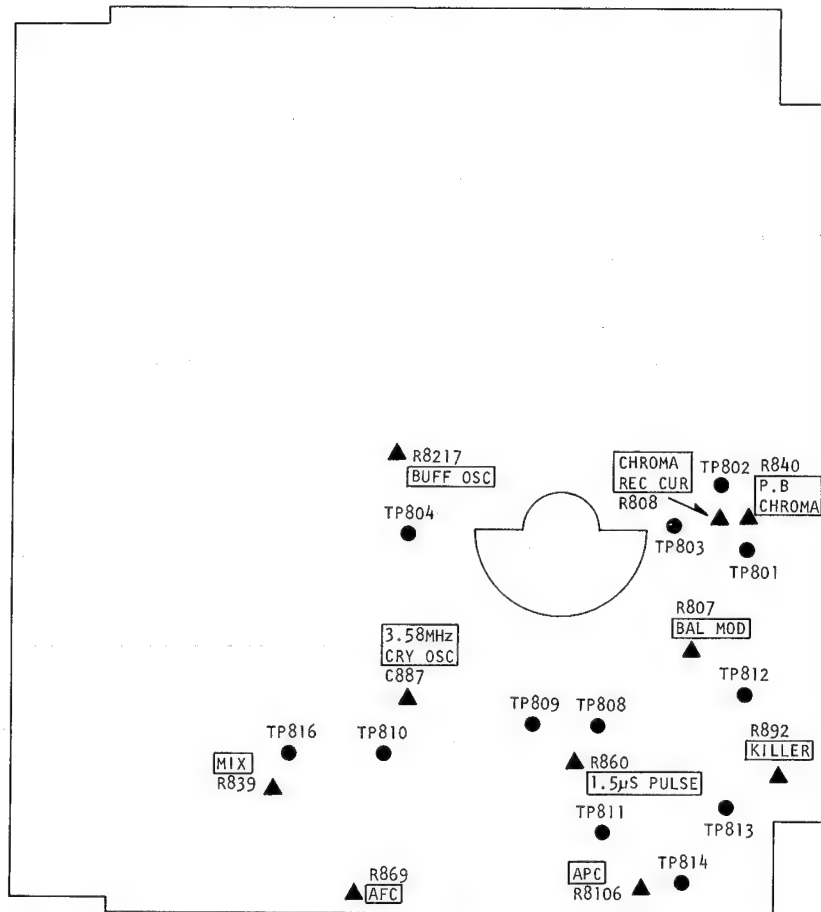


Fig.E51. Video Process Circuit Board-Chroma Section
(This circuit board is located on the bottom of the deck)

Test Point: TP809

Adjustment: C887

1. No need to supply any video signal to the rear panel.
2. Place the unit in STOP mode.
3. Connect the frequency counter to TP809 on the Video Process board.
4. Adjust the capacitor C887 so the frequency at TP809 is $3.579545\text{MHz} \pm 10\text{Hz}$.

2-4-11. LP/SP Burst Level Confirmation

Test Point: TP802

1. Supply a color bar signal to the Video Input on the rear panel or tune in a local on-air color TV program. Place the select switch in the Tuner or Line position.
2. Place the unit in the RECORD mode.
3. Set the SP/LP/SLP selector on the front panel to the SP mode.

4. Connect the scope to TP802 on the Video Process board and read the burst level and cyan level.
5. Change the selector from SP to LP and read the burst level and cyan level.
6. Confirm that the burst level in the SP mode is 1.6 ± 0.3 times bigger than the burst level in the LP mode and the cyan level in the LP mode is 1.0 - 1.2 times bigger than the cyan level in the SP mode.
7. Change the selector from LP to SLP and read the burst level and cyan level.
8. Confirm that the burst level and cyan level in the SLP mode is almost the same as in the SP mode.

2-4-12. 1.5 μ s Pulse Adjustment

Test Point: TP811

Adjustment: R860 (1.5 μ s PULSE ADJ)

1. Supply a color bar signal to the Video Input on the rear panel or tune in a local on-air TV Program. Place the select switch in the Tuner or Line position.
2. Insert a cassette and make a recording in SP mode.
3. Connect the scope to TP811 on the Video Process board.
4. Adjust the 1.5 μ s PULSE ADJ (R860) on the same board so the T portion of waveform at TP811 is $1.5 \pm 0.1 \mu\text{sec}$.

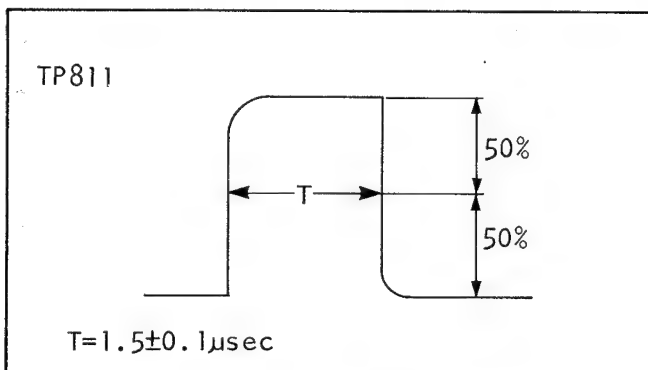


Fig.E52. 1.5 μ sec Pulse

2-4-13. AFC Adjustment

Test Points: TP810, TP811

Adjustment: R869 (AFC ADJ)

1. Supply a color bar signal to the Video Input on the rear panel or tune in a local on-air TV program. Place the select switch in the Tuner or Line position.
2. Insert a cassette and make a recording in SP mode.
3. Connect the scope CH1 to TP810 and CH2 to TP811 on the Video Process board. Set the scope to ADD mode.
4. Adjust the AFC ADJ (R869) on the same board so the phase relationship between TP810 and TP811 are as shown in Fig.E53.

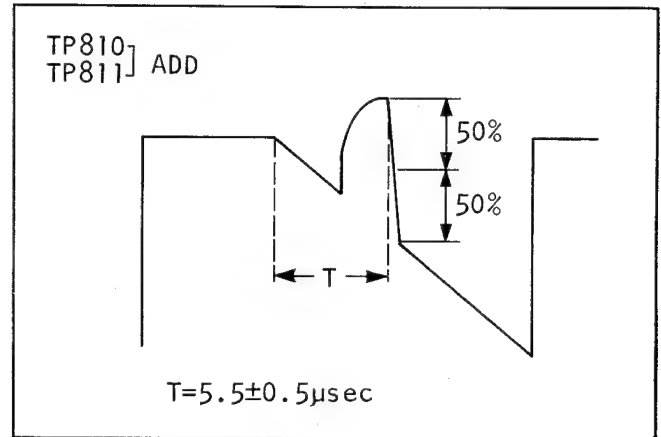


Fig.E53. AFC

2-4-14. APC 3.58MHz VX0 Adjustment

Test Point: TP814

Adjustment: R8106 (APC ADJ)

1. Supply a B/W video signal to Video Input on the rear panel or tune in a local on-air B/W TV program.
2. Connect a jumper between TP813 and ground through a capacitor 16V 47 μ F.
3. Insert a cassette and make a recording.
4. Connect a frequency counter to TP814.
5. Adjust the APC ADJ (R8106) so the frequency at TP814 is $3.579545\text{MHz} \pm 10\text{Hz}$.

2-4-15. Comb Filter Adjustment

A. Factory Adjustment

Test Point: TP802

Adjustment: R839 (MIX ADJ)

1. Connect a color bar signal to Video Input on the rear panel.
2. Connect a capacitor (0.047 μ F or more) between TP805 and ground.
3. Connect a capacitor 0.01 μ F between TP301 and TP815 on the Video Process board.
4. Connect a jumper between base of Q818 and ground.
5. Place the unit in STOP mode.
6. Connect a vector scope to TP802.
7. External trigger a vector scope by TP808.
8. Adjust the MIX ADJ (R839) so that the level of R_a and R_b are balanced. ($|R_a| = |R_b|$).
9. Alternately turn transformer T801 so R_a and R_b are just on R .

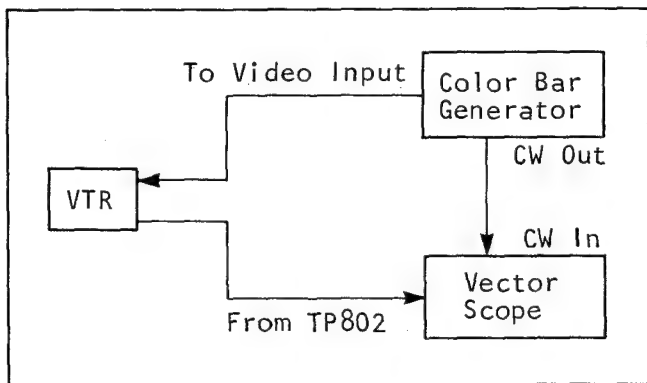


Fig.E54.

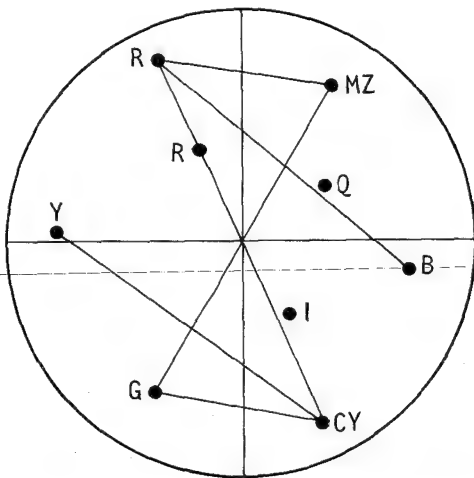


Fig.E55. Vector Display of Color Bars

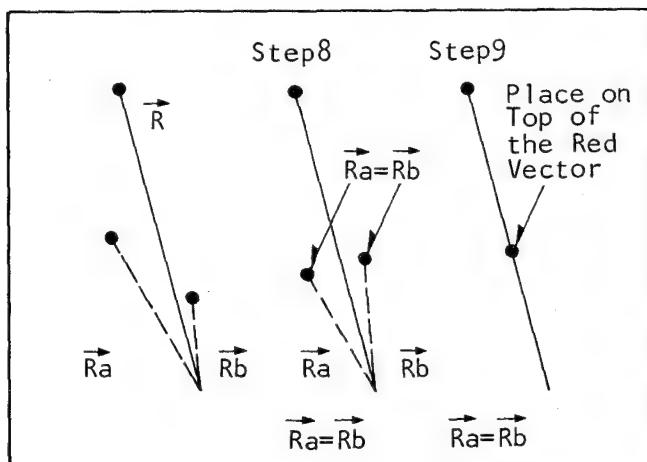


Fig.E56. Comb Filter

B. Field Adjustment

1. Supply a color bar signal to the Video Input on the rear panel.
2. Place the unit in the RECORD mode and make a recording in LP mode.

3. Connect the scope to TP317 on the Video Process board.
4. Play back the portion just recorded.
5. Turn the Tracking Control on the front panel for poorest tracking. (Worst playback image)
6. During play back, adjust the MIX ADJ (R839) on the Video Process board for minimum beat on the Chrominance portion as shown below.

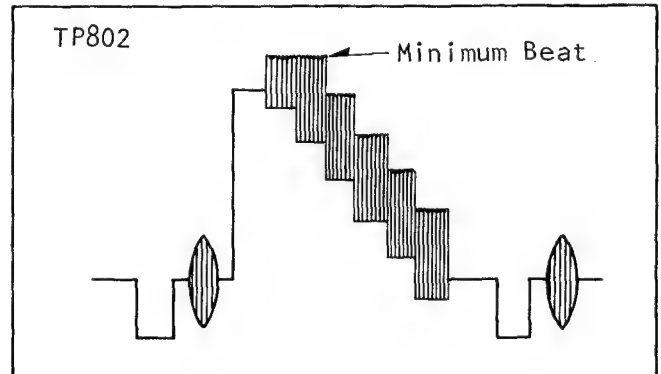


Fig.E57.

Note: In this field adjustment procedure, the phase adjustment can not be performed, therefore, do not turn transformer T801.

2-4-16. BALANCE Modulator Adjustment Test Point: TP805

Adjustment: R807 (BALANCE MOD ADJ)

1. Supply a color bar signal to Video Input on the rear panel or tune in a local on-air color TV program.
2. Place the unit in the PLAYBACK mode.
3. Connect the scope to TP805 on the Video Process board.
4. Adjust the BALANCE MOD. ADJ. (R807) for minimum carrier as shown below.

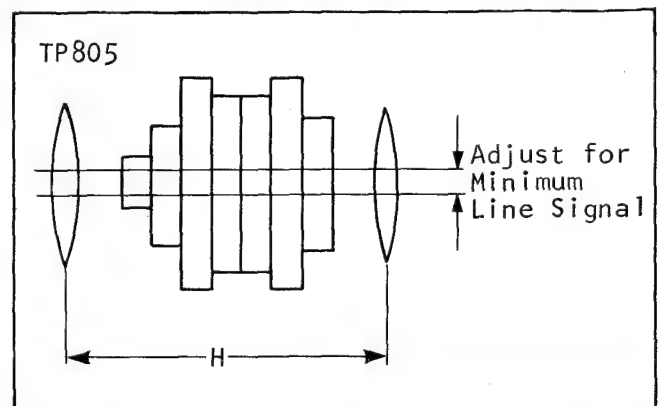


Fig.E58. Modulation Balance

2-4-17. Color Killer Adjustment

Test Point: TP812

Adjustment: R892 (KILLER ADJ)

1. Supply a color bar signal to the Video Input on the rear panel or tune in a local on-air color TV program. Place the select switch in the Tuner or Line position.
2. Connect a 27Ω resistor in parallel with R3162 on the Video Process board to reduce the chroma input by about 24dB (19mVp-p).
3. Connect the scope to TP812 on the Video Process board and monitor with the scope in the DC coupling mode.
4. Place the unit in the RECORD mode.
5. Turn the KILLER ADJ (R892) CCW, then turn it slowly clockwise just to the point where the DC voltage changes from Low to High (More than 8V DC) on the scope.
6. Supply a B/W signal to Video Input on the rear panel or tune in a local on-air B/W TV program.
7. Make sure that the voltage at TP812 is low.

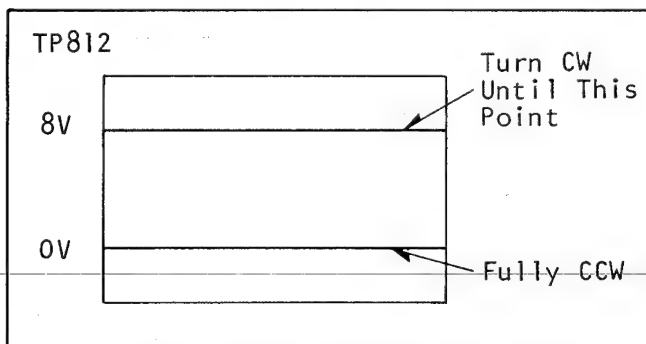


Fig.E59. Scope Display at TP812

2-4-18. Video/Chroma Level Adjustment

Test Point: TP317

Adjustments: R3118 (P.B. LEVEL ADJ)

R840 (CHROMA P.B. LEVEL ADJ)

1. Supply a color bar signal to the Video Input on the rear panel or tune in a local on-air TV program.
2. Insert a cassette and make a recording for a few minutes.
3. Connect the scope to TP317 on the Video Process Board.
4. Play back the portion just recorded.
5. During playback, adjust the P.B. LEVEL ADJ (R3118) so the video level is $2.0 \pm 0.1\text{Vp-p}$.
6. Then adjust the CHROMA P.B. LEVEL ADJ (R840) on the Video Process board so the level of cyan portion is $1.2 \pm 0.05\text{Vp-p}$.

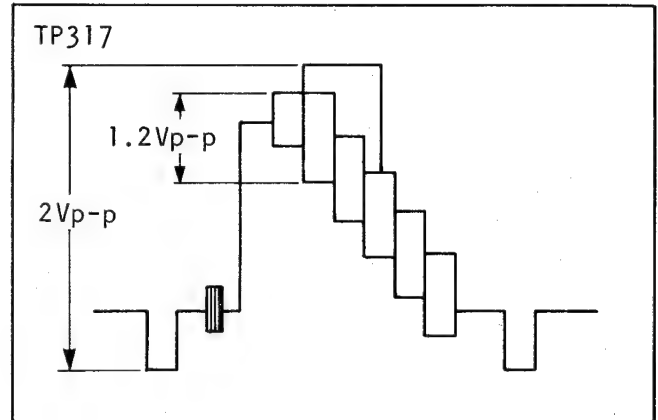


Fig.E60. Video/Chroma Level

2-4-19. Audio Bias Trap Adjustment

Test Point: TP318

Adjustment: L509

1. Cover the photo transistor with a piece of black tape.
2. Place the unit in the PLAY/AUDIO DUB mode with no tape in the unit.
3. Connect the scope to TP318 on the Video Process board.
4. Adjust L509 on the same board so the audio bias leak is minimum as shown below.

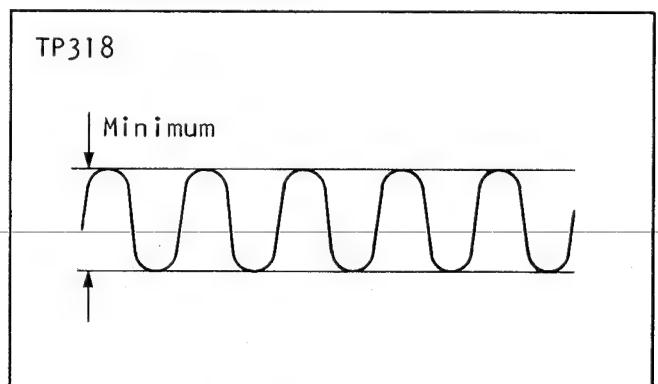
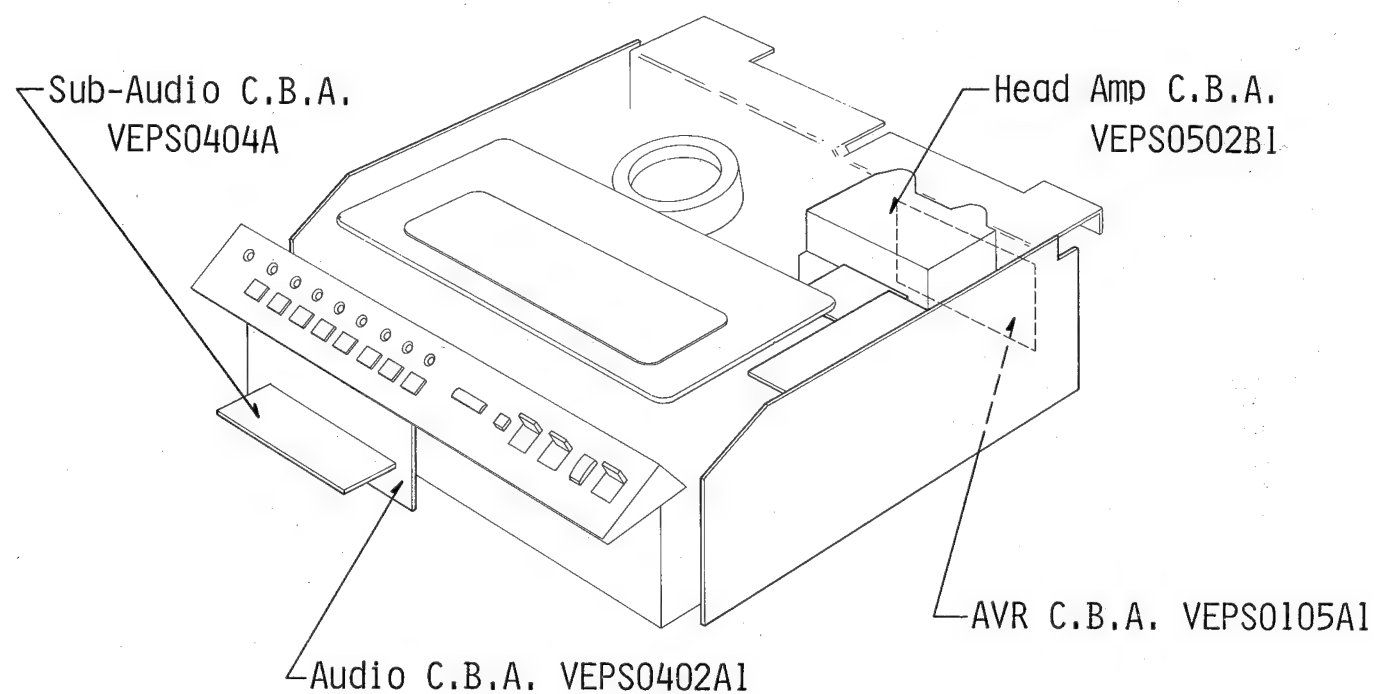


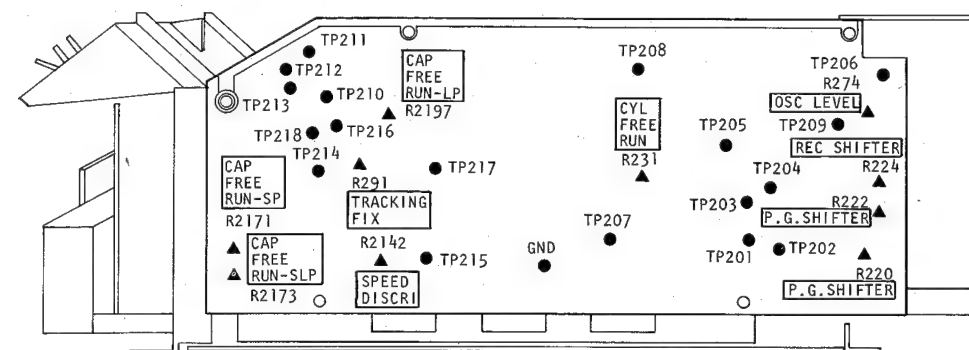
Fig.E61. Audio Bias

MEMO

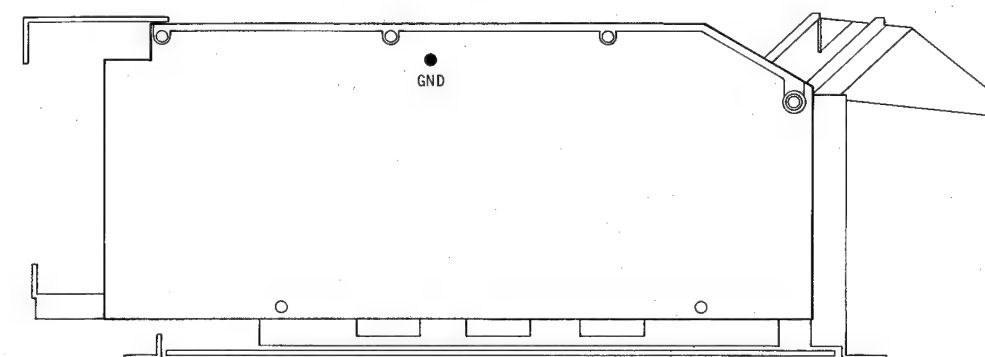
Location of Test Points and Controls



Servo C.B.A. VEPS0204A1



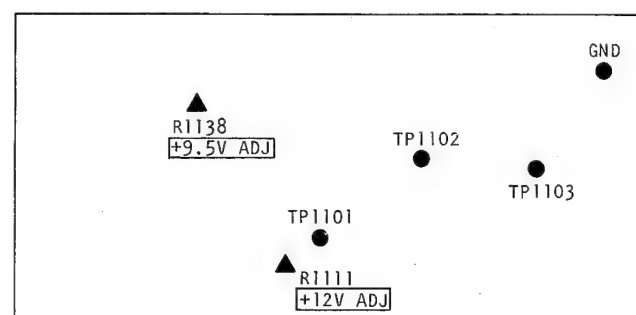
System Control C.B.A. VEPS0601A1



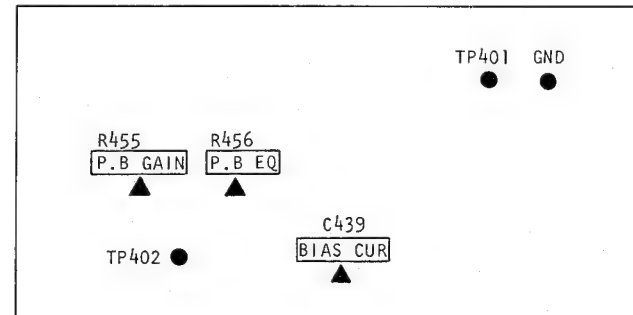
Video Process C.B.A. VEPS0303A1

AVR C.B.A. VEPS0105A1

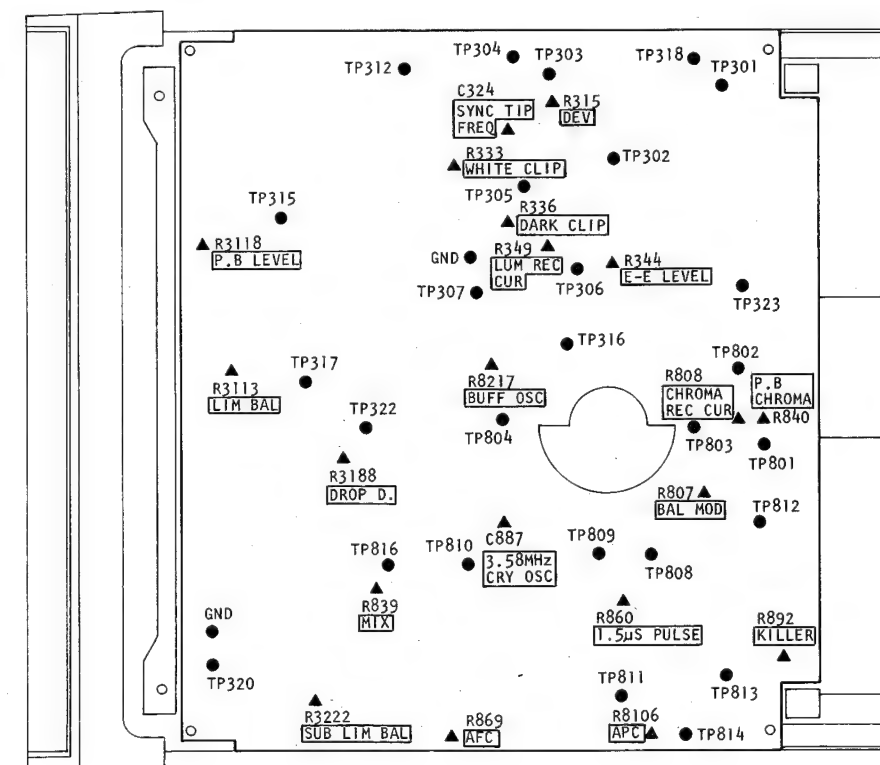
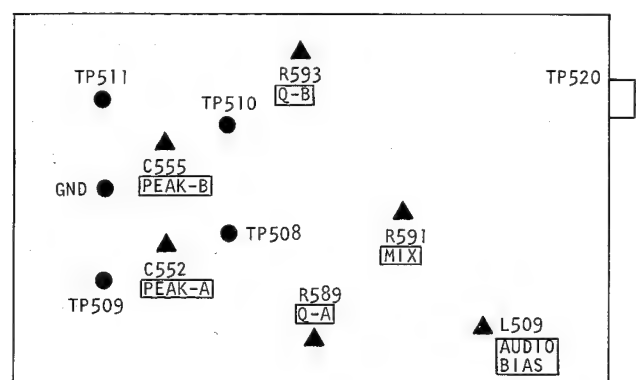
Viewed From Component Side



Audio C.B.A. VEPS0402A1



Head Amp C.B.A. VEPS0502B1



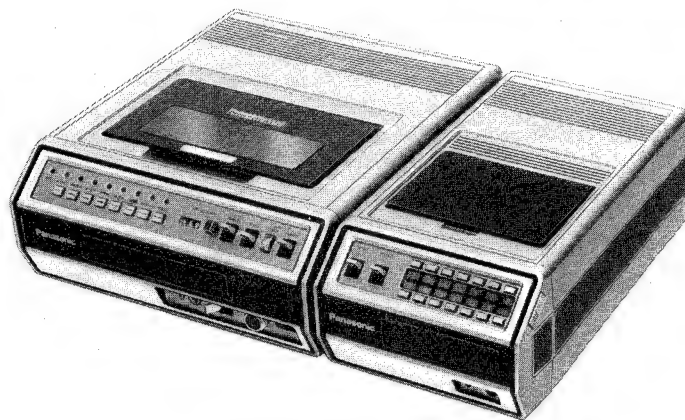
Service Manual

Vol. 3

Block Diagrams
Schematic Diagrams

Portable Video Cassette Recorder

Panasonic **VHS**
Omnivision IV

PV-2600


SPECIFICATIONS

Power Source:	Deck: DC 12V Tuner unit: 120V AC, 60Hz	Output Level:	Video: VIDEO OUT jack (RCA) 1.0Vp-p 75Ω unbalanced Audio: LINE OUT jack (RCA) -6dB, 1kΩ unbalanced Earphone Jack -20dB, 200Ω unbalanced RF Modulated: Channel 3 or 4 72dBμ (open voltage), 75Ω unbalanced
Power Consumption:	Deck: Approx. 12 watts (Playback mode) Tuner unit: Approx. 75 watts	Video Horizontal	Resolution: Color: more than 230 lines B/W: more than 270 lines
Television System:	EIA Standard (525 lines, 60 fields) NTSC color signal	Signal-to-Noise Ratio:	Video: SP mode: better than 40dB LP mode: better than 40dB SLP mode: better than 40dB (Rohde & Schwarz noise meter) Audio: SP mode: better than 42dB LP mode: better than 40dB SLP mode: better than 40dB
Video Recording	System: 2 rotary heads, helical scanning system Luminance: FM azimuth recording Color signal: converted subcarrier phase shift recording	Operation	Temperature: 41°F-104°F (5°C-40°C) Operating Humidity: 10%-75%
Audio Track:	1 track	Weight:	Deck: 18.3 lbs. (8.3kg) Tuner unit: 12.6 lbs. (5.7kg)
Tape Format:	Tape width 1/2 inch (12.7mm), high density tape	Dimensions:	Deck: 12-1/4"(W) × 14-3/8"(D) × 5-5/8"(H) 308(W) × 362(D) × 140(H)mm Tuner unit: 7-5/8"(W) × 14-1/8"(D) × 5-5/8"(H) 192(W) × 356(D) × 140(H)mm
Tape Speed:	SP/1-5/16 i.p.s. (33.35mm/s), LP/21/32 i.p.s. (16.67mm/s), SLP/7/16 i.p.s. (11.12mm/s)	Available Tapes:	1/2" VHS video cassette tapes NV-T120 Approx. 810ft. (257m), 2, 4 or 6 hrs. NV-T60 Approx. 417ft. (127m), 1, 2 or 3 hrs.
Record/Playback Time:	360 min. with NV-T120		
FF/REW Time:	Less than 4.5 min. with NV-T120		
Heads:	Video: 2 rotary heads Audio/Control: 1 stationary head Erase: 1 full track erase 1 audio track erase for audio dubbing		
Input Level:	Video: VIDEO IN jack (RCA) 1.0Vp-p, 75Ω unbalanced Audio: MIC IN jack -70dB, 600Ω -70dB, 600Ω unbalanced LINE IN jack (RCA) -20dB, 100kΩ unbalanced TV Tuners: VHF input Ch2~Ch13 75Ω unbalanced UHF input Ch14~Ch83 300Ω balanced		

Weight and dimensions shown are approximate. Specifications are subject to change without notice.

Panasonic®

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Ontario L4W 2K9 Canada

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2. BLOCK DIAGRAMS

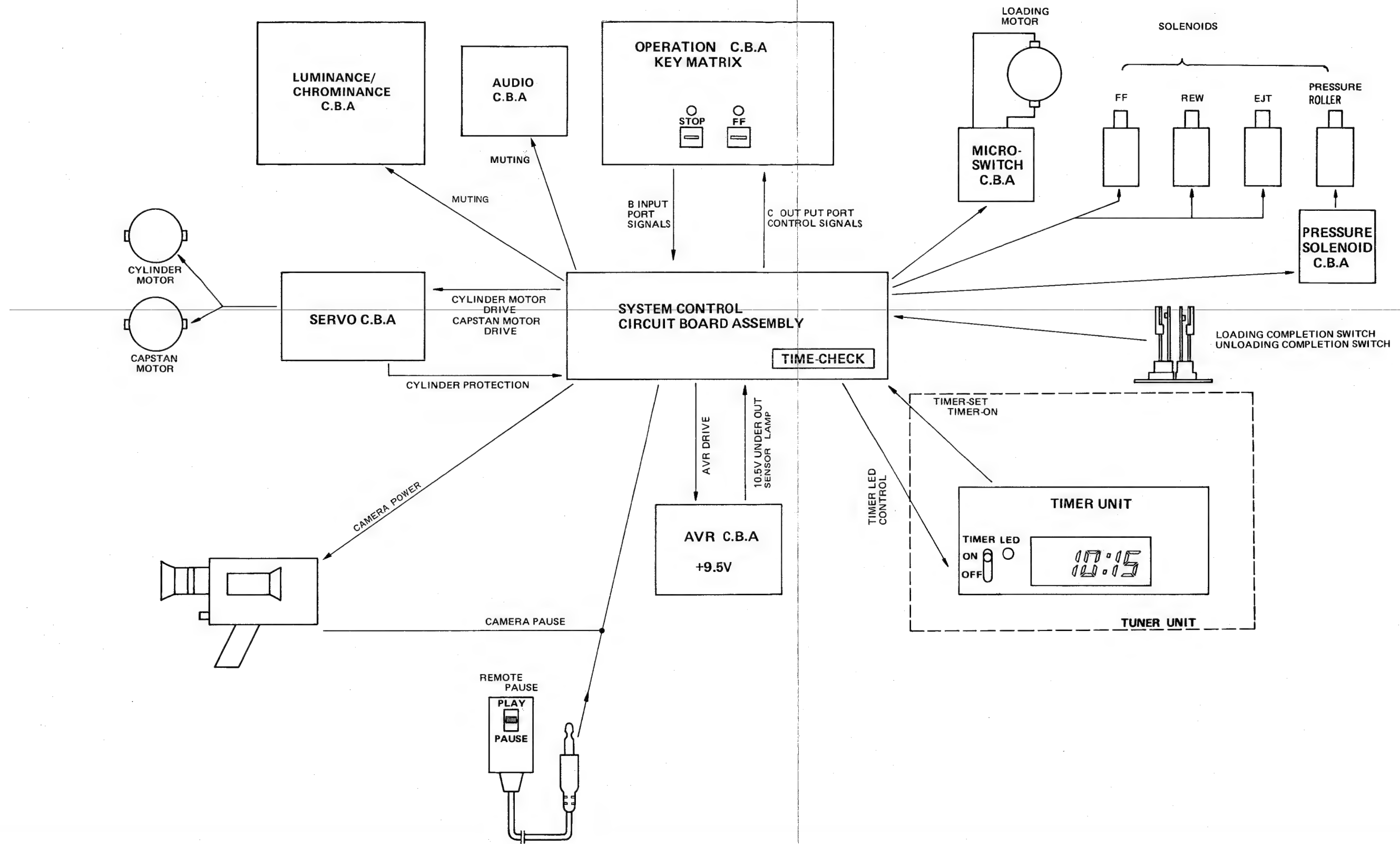
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3. SCHEMATIC & CIRCUIT BOARD DIAGRAMS

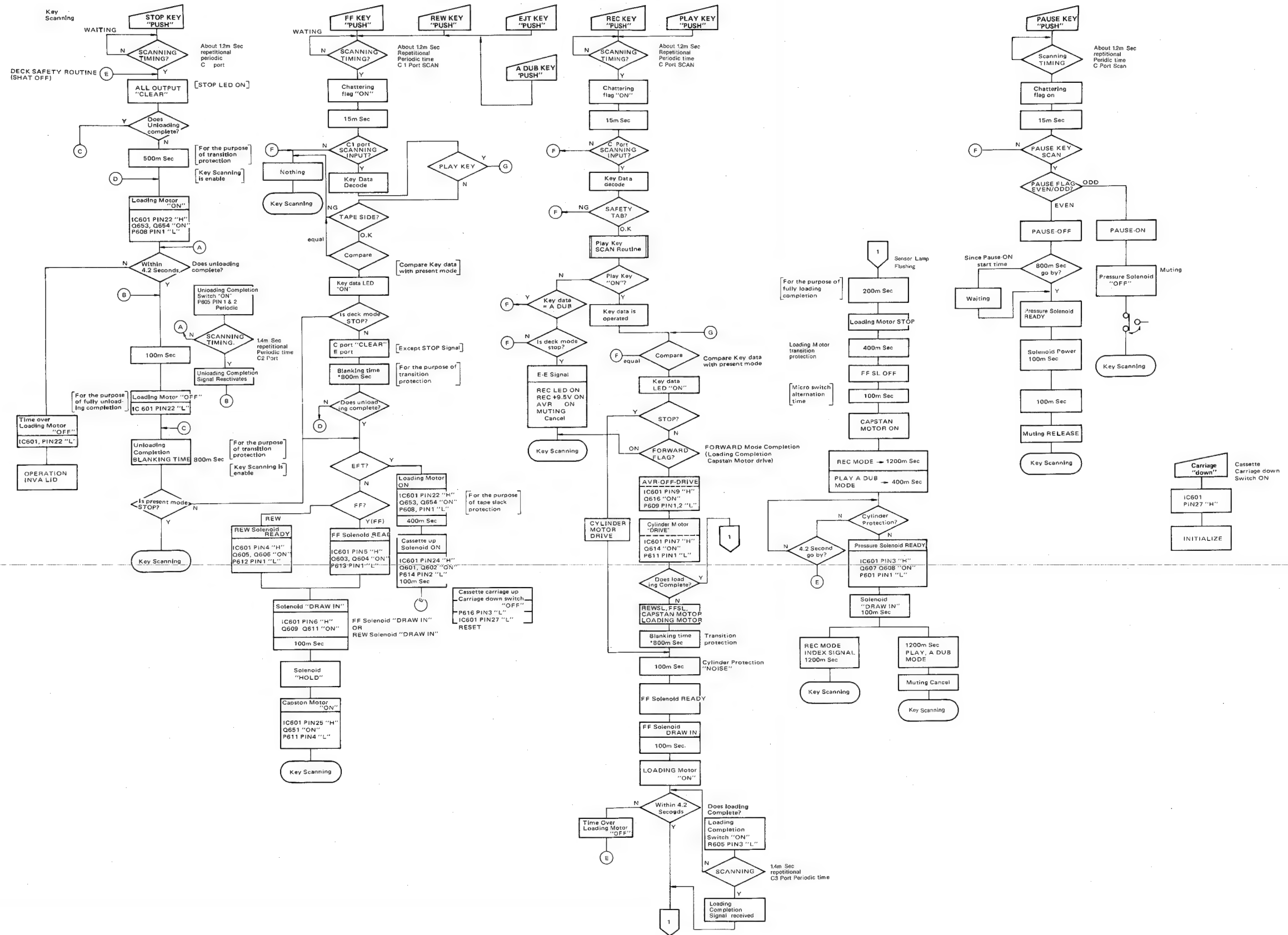
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SYSTEM CONTROL FUNCTION CHART

3-1
SYSTEM CONTROL FUNCTION CHART

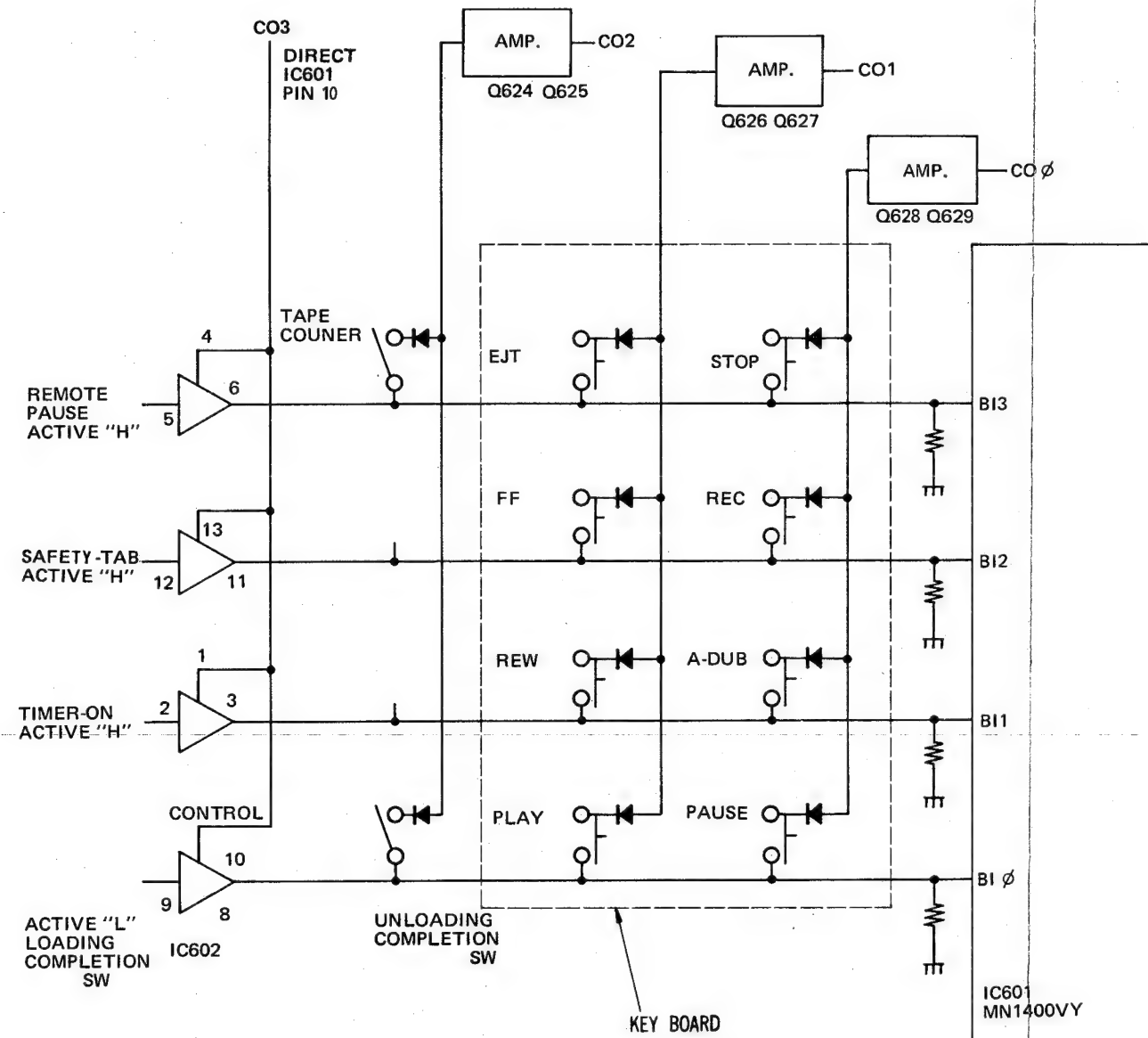


SYSTEM CONTROL FLOW CHART



KEY SCANNING CHART

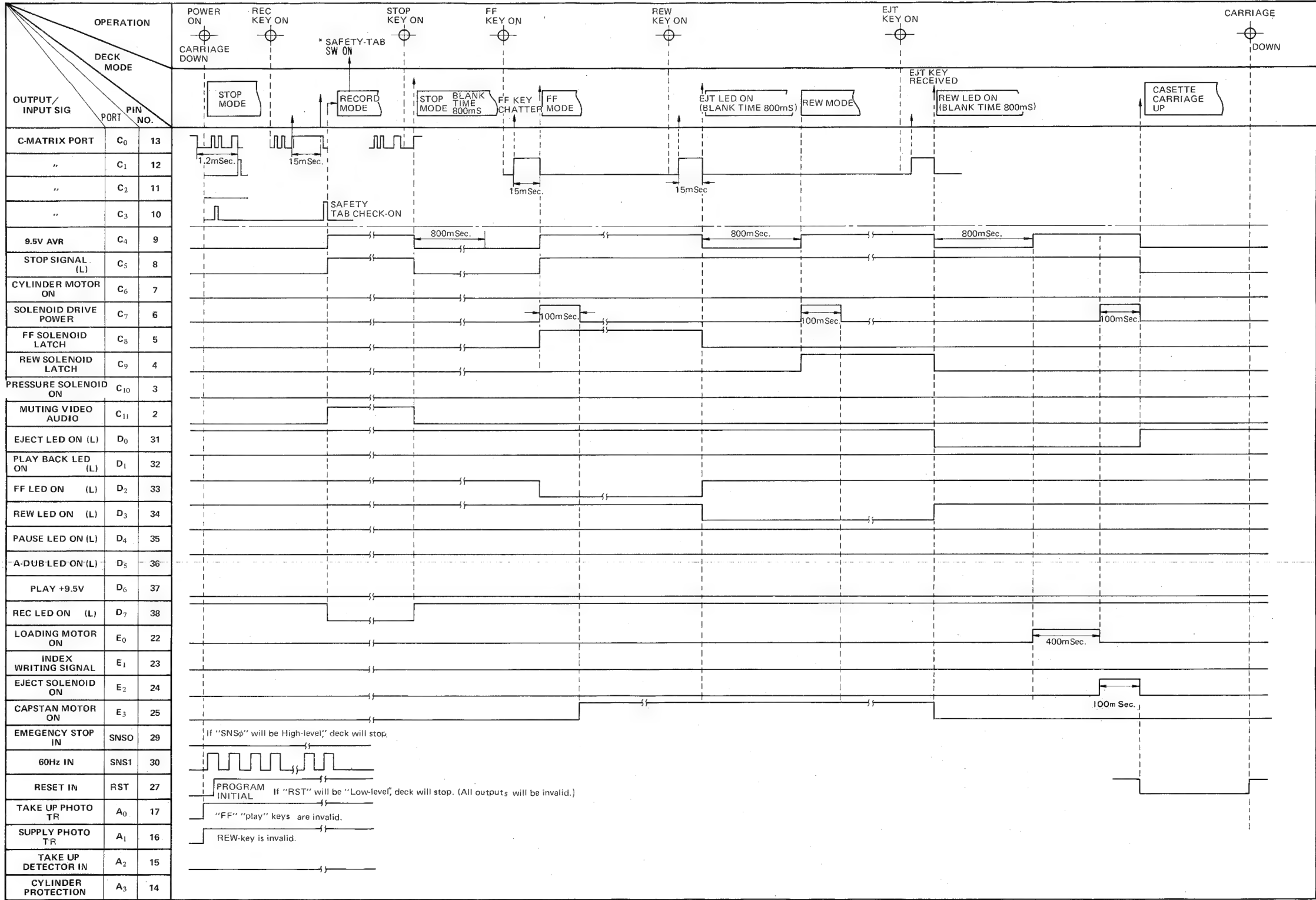
3-3
KEY SCANNING CHART



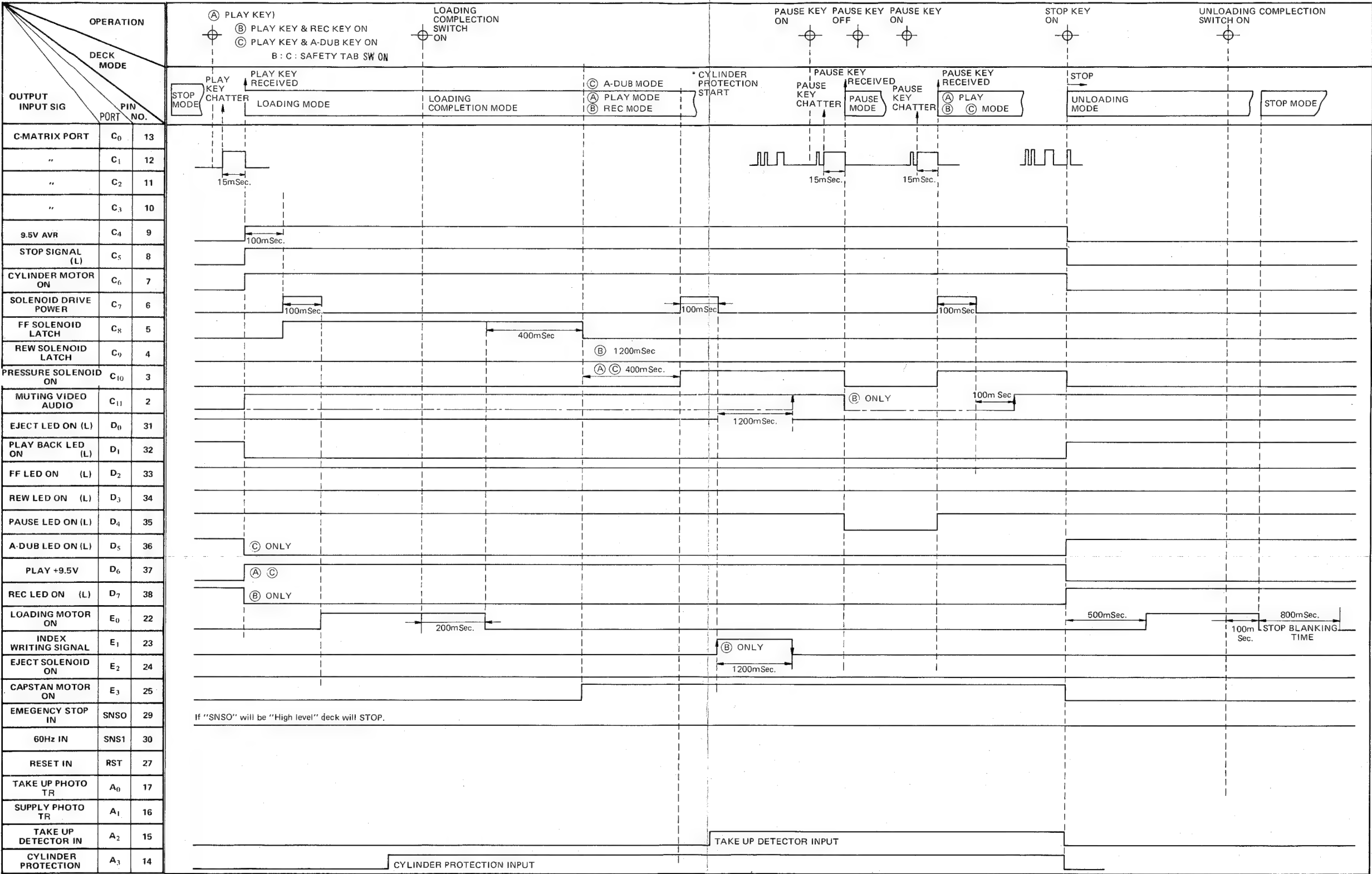
IC602
TRI-STATE BUFFER

CONTROL	INPUT	OUTPUT	
"L"	"X"	HIGH "Z"	(FLOATING)
"H"	"H"	"H"	
"H"	"L"	"L"	

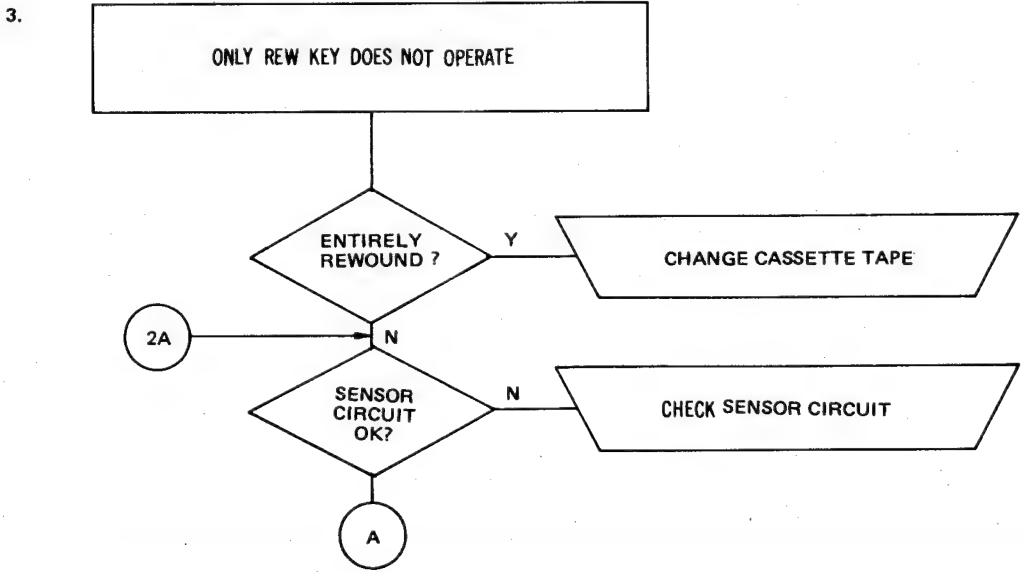
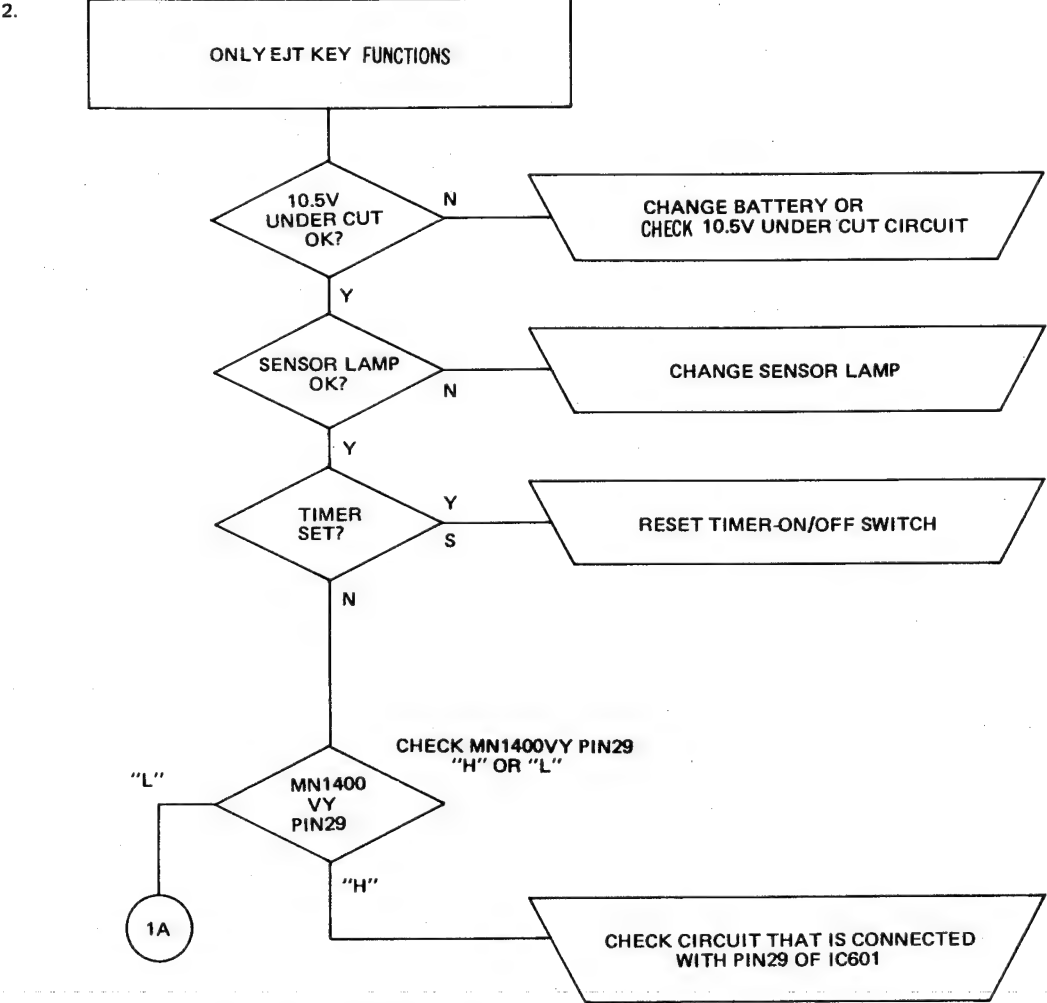
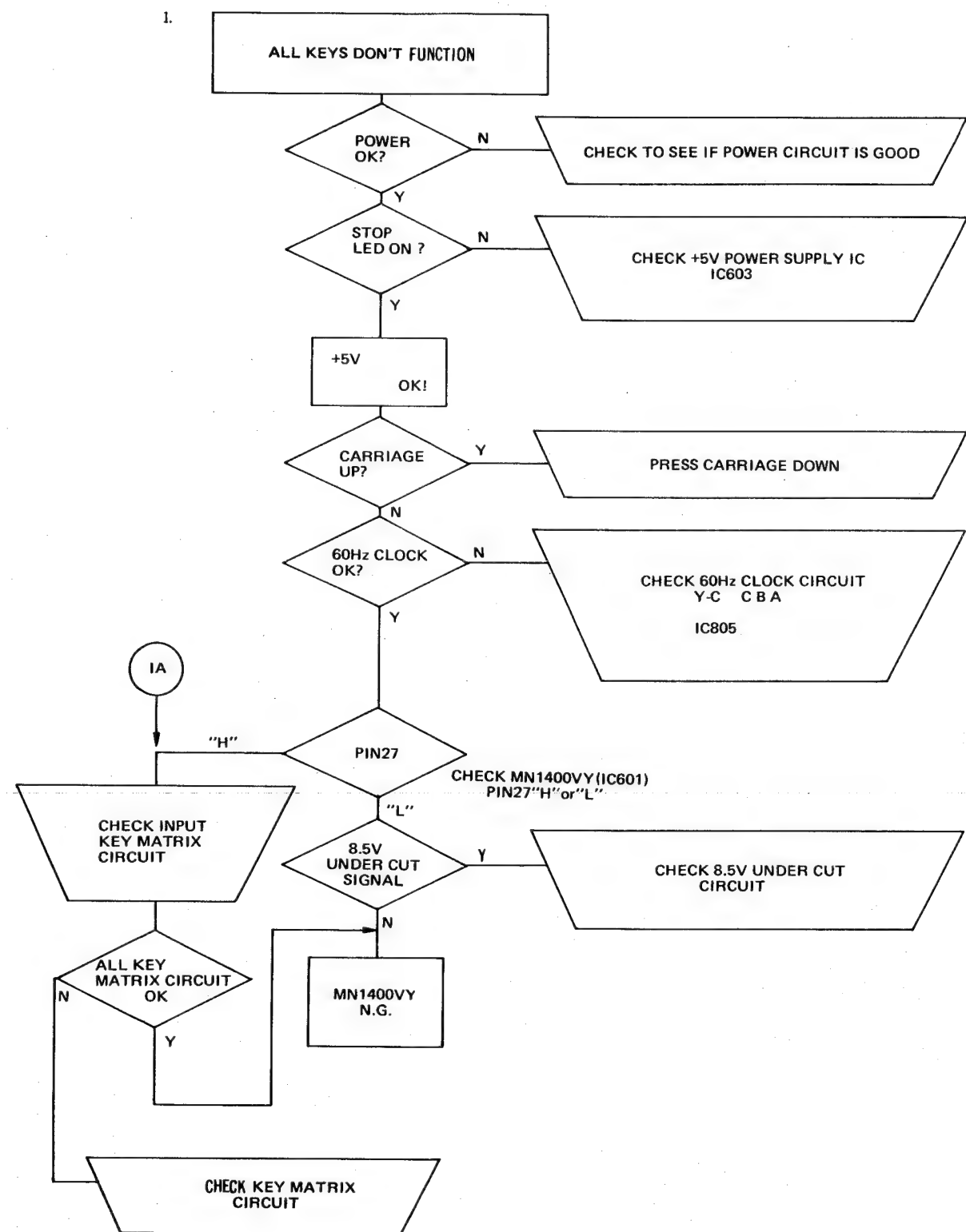
MICROPROCESSOR TIMING CHART(1)

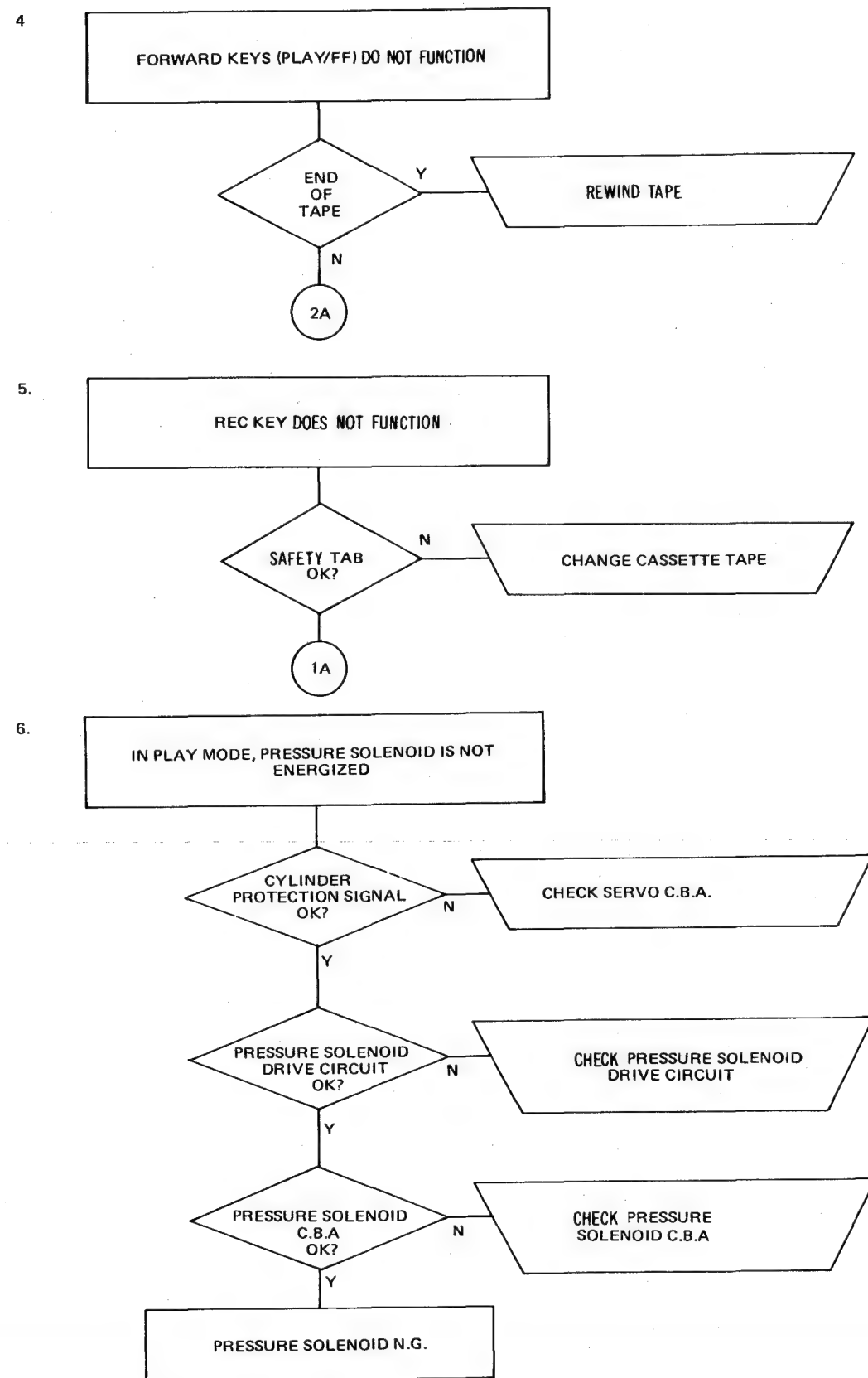


MICROPROCESSOR TIMING CHART(2)

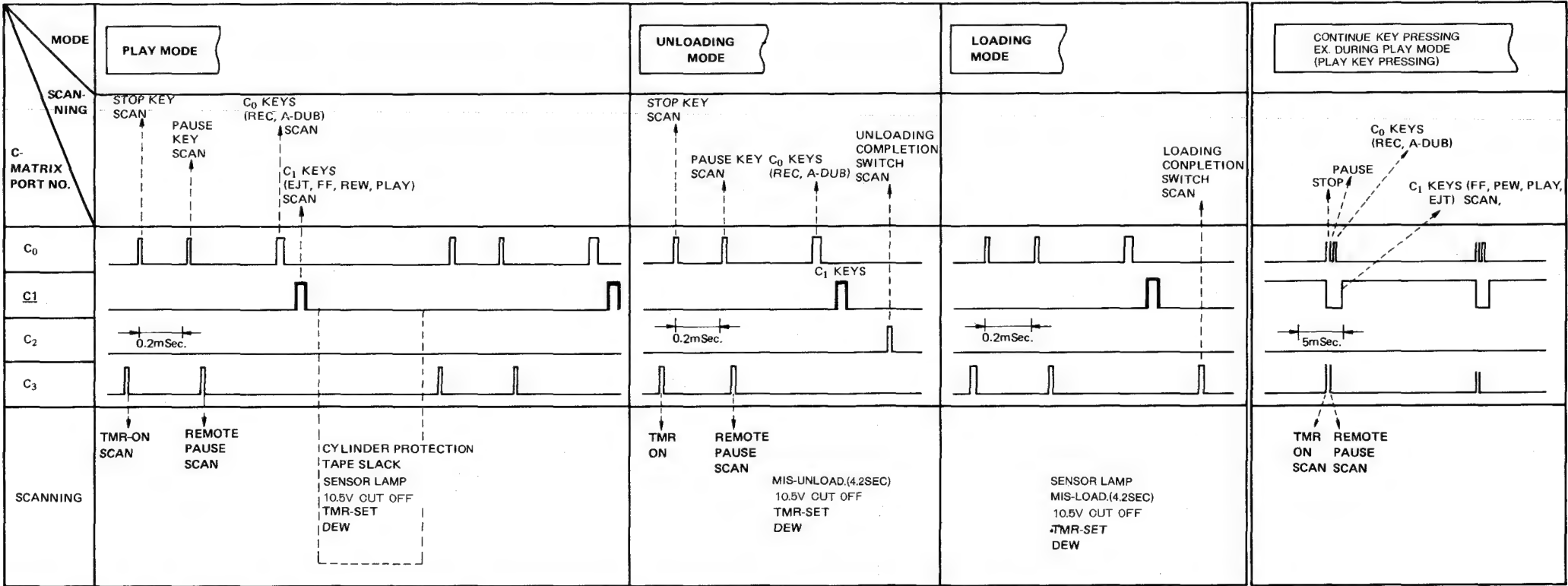
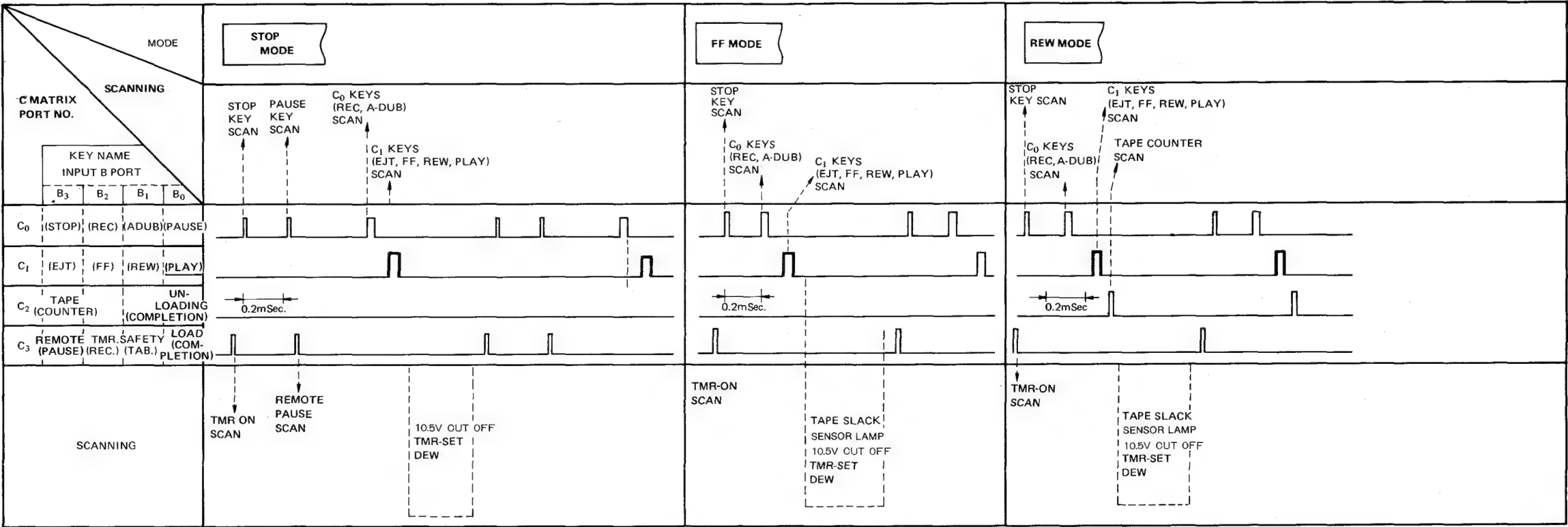


TROUBLESHOOTING PROCEDURES FOR SYSTEM CONTROL CIRCUIT

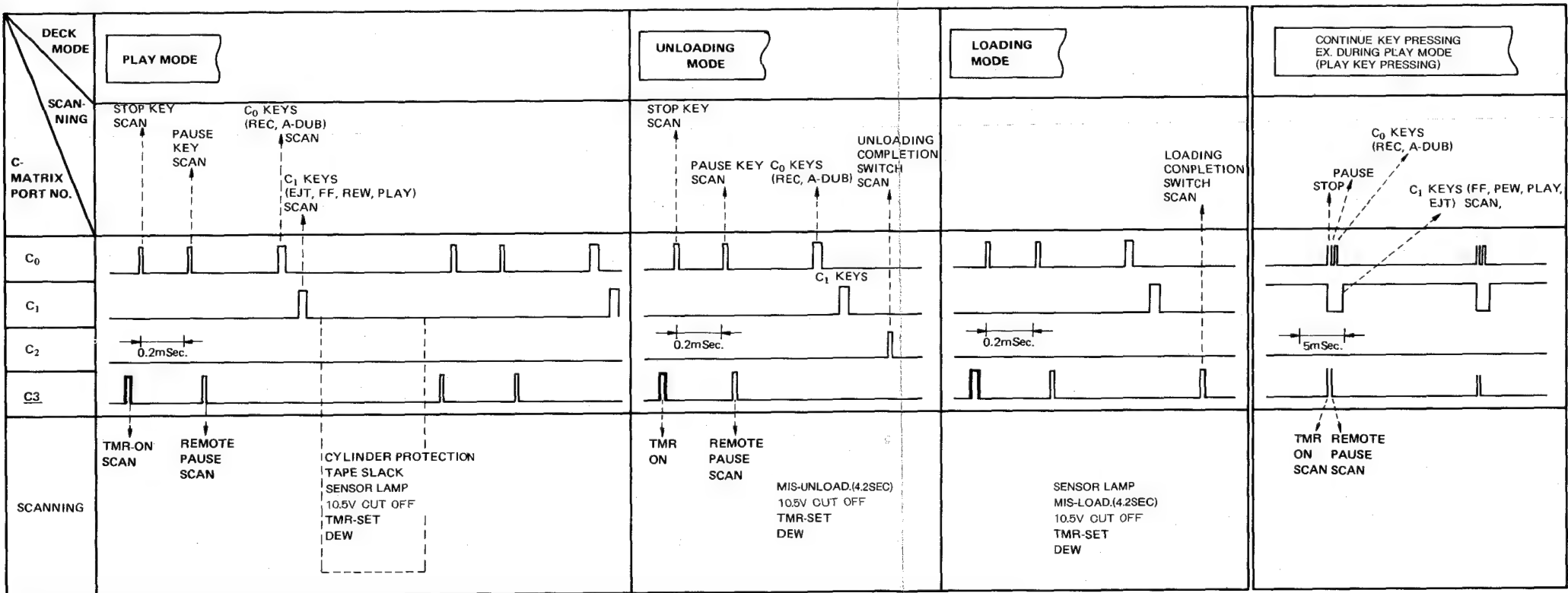
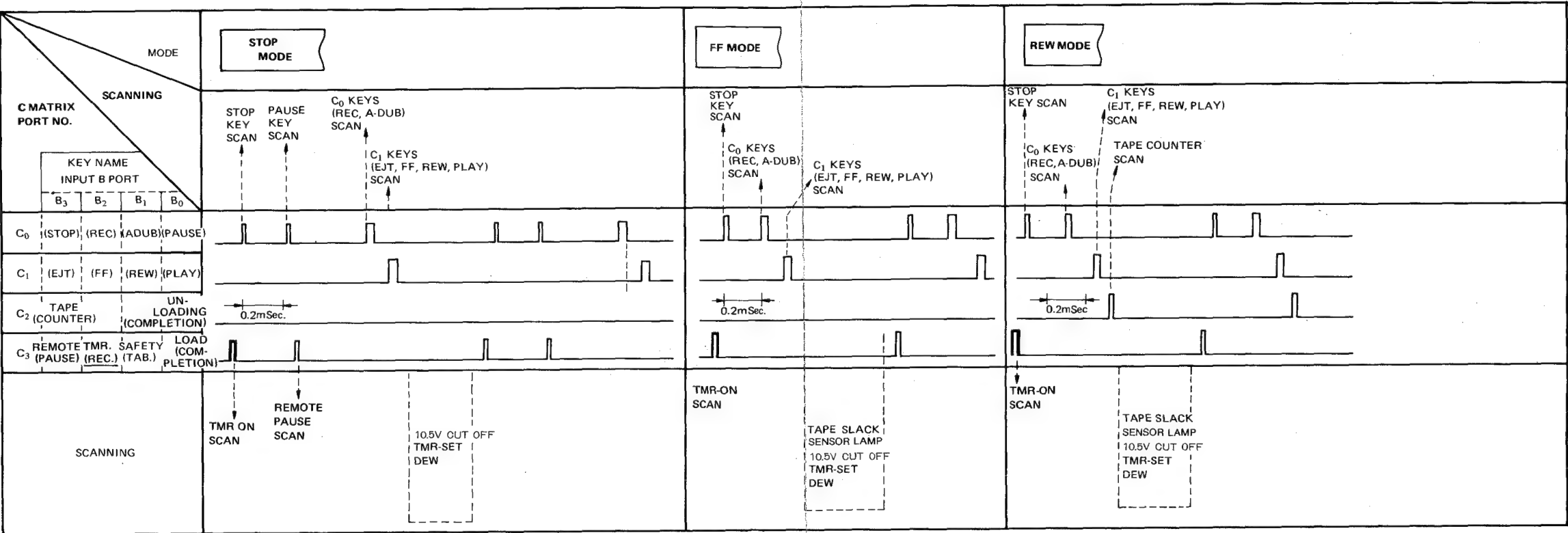




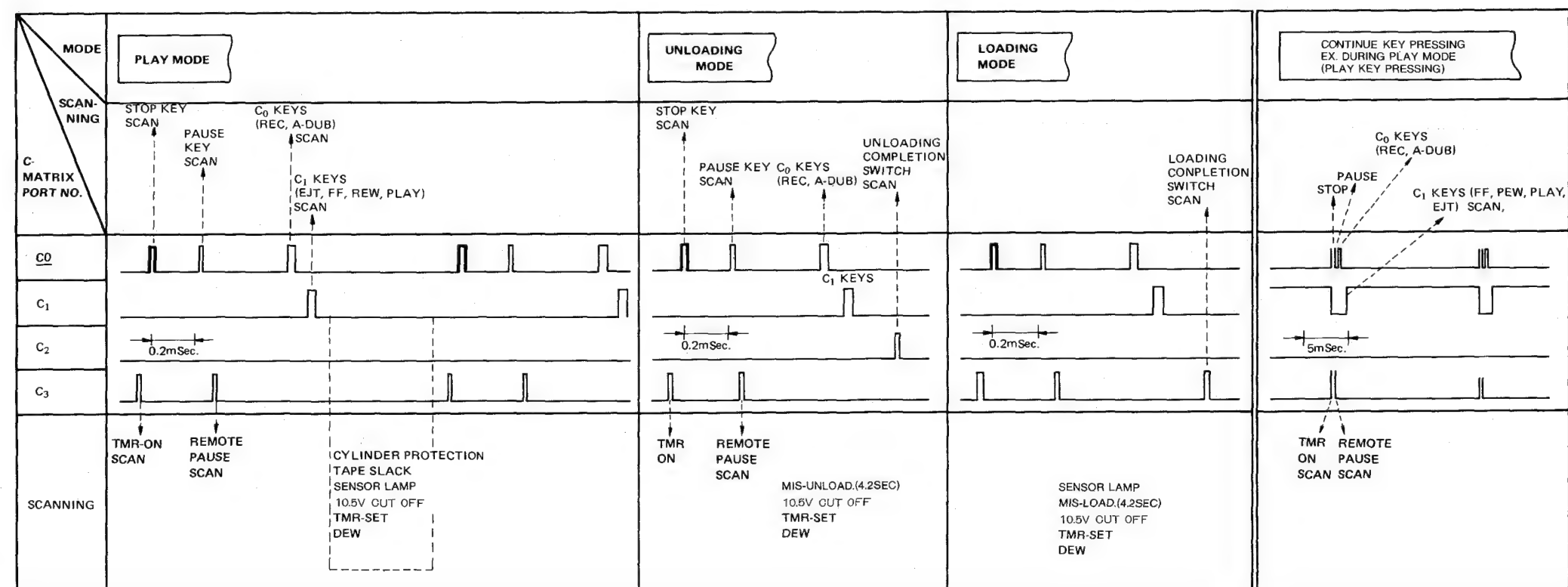
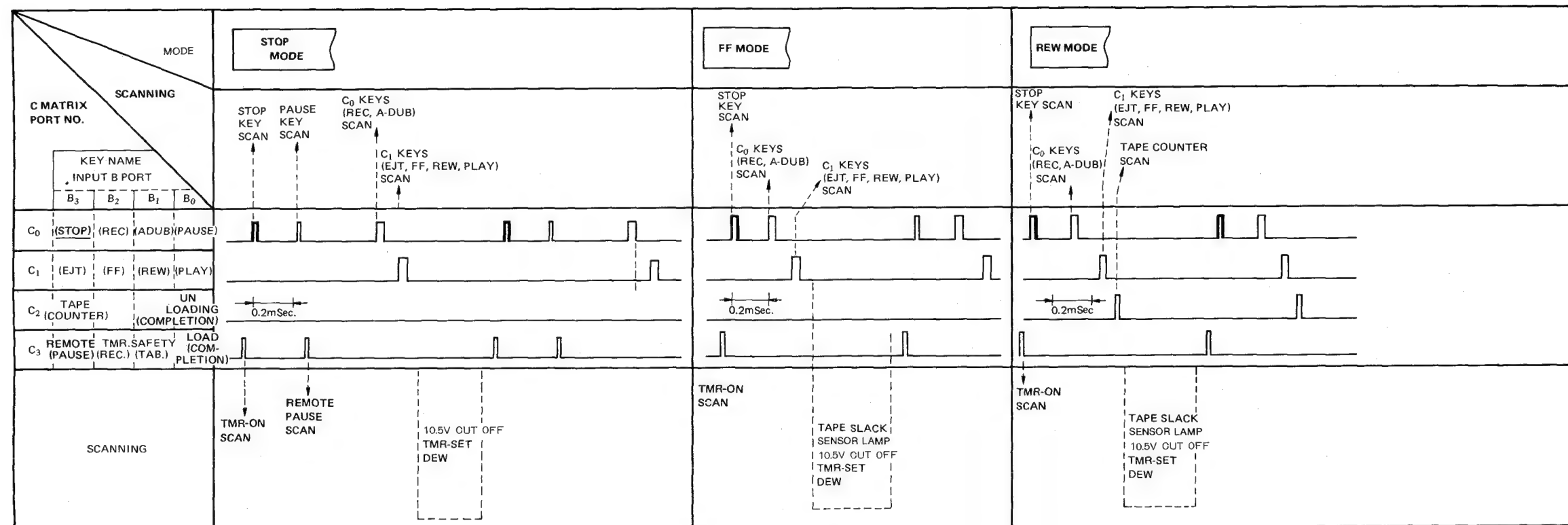
PLAY KEY SCAN TIMING



TIMER REC SCAN TIMING

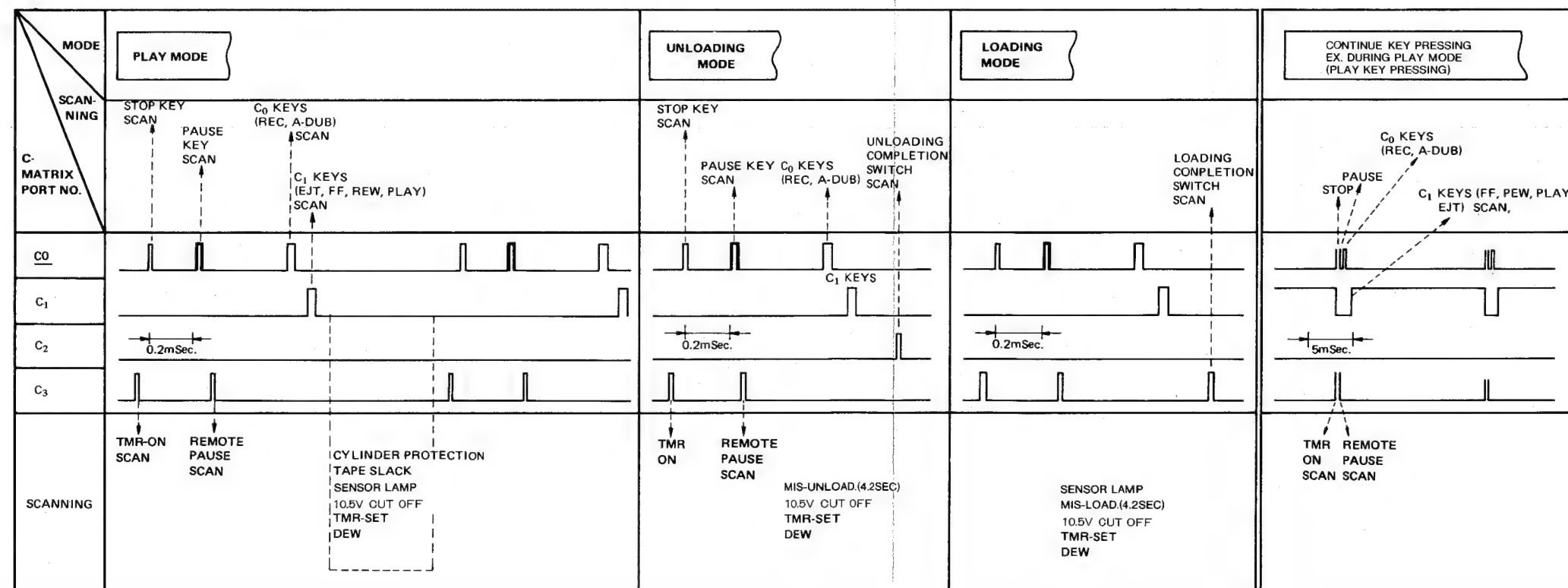
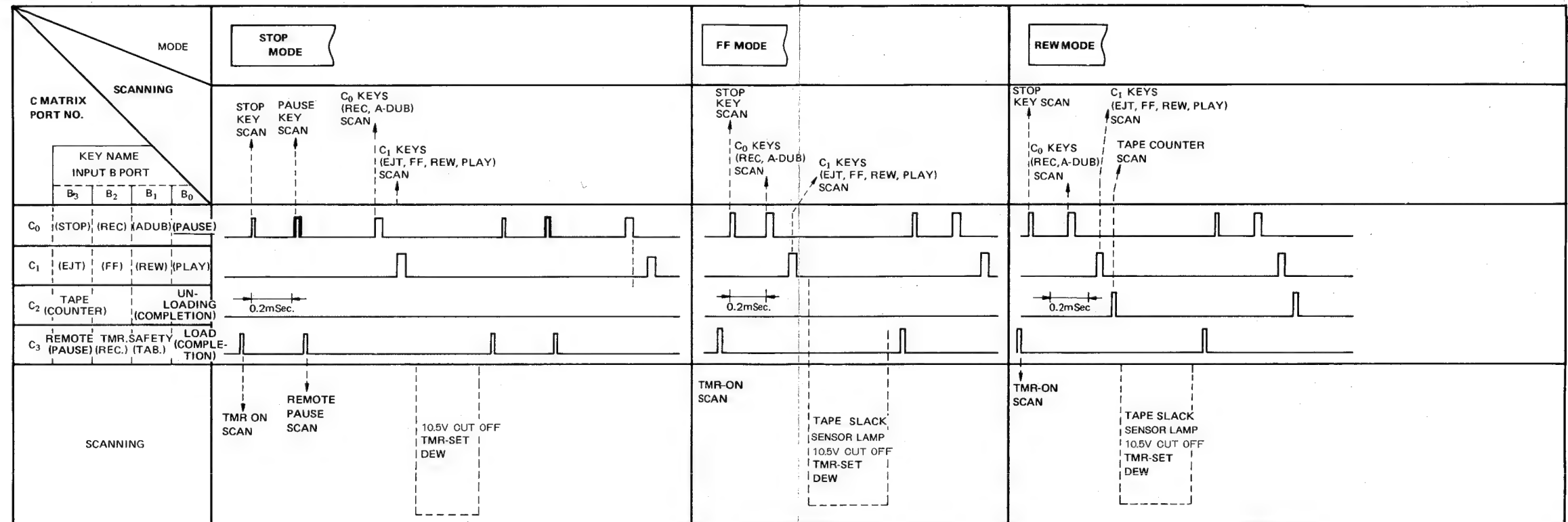


STOP KEY SCAN TIMING

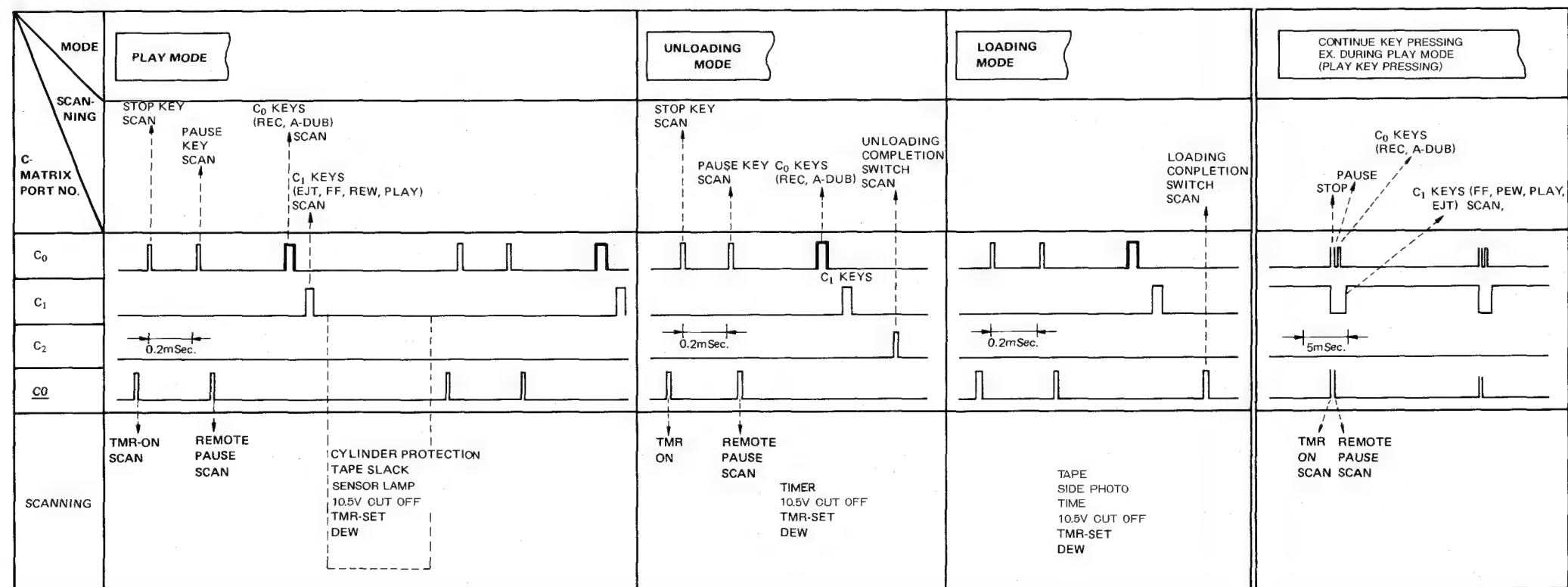
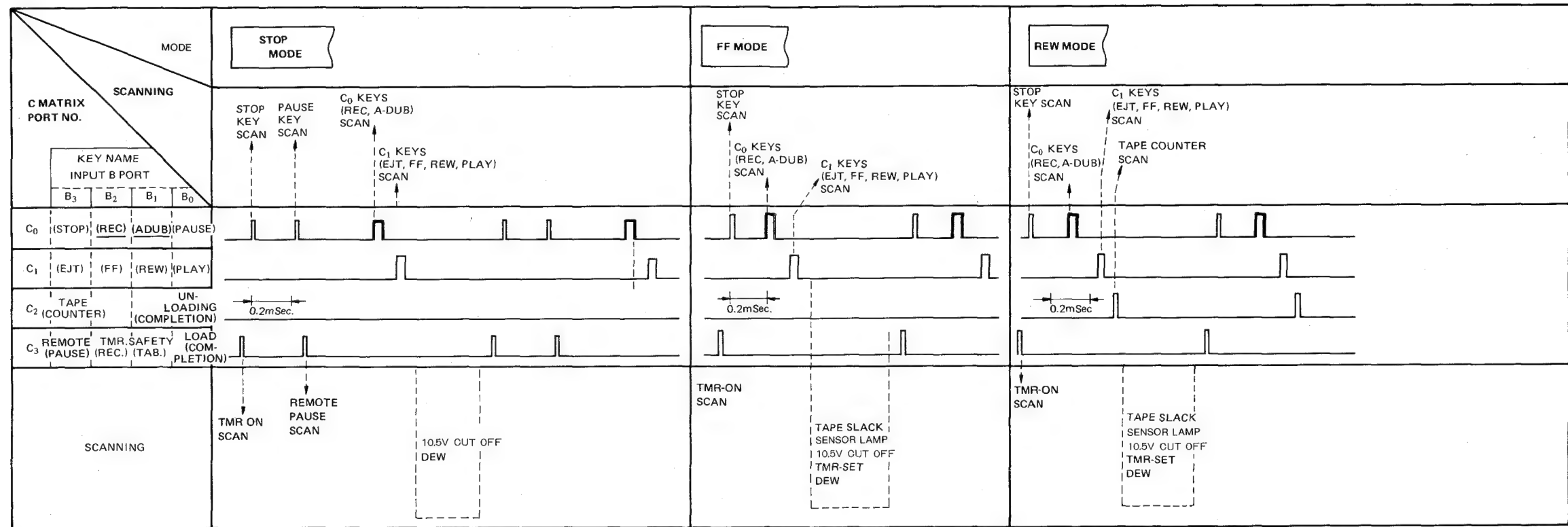


PAUSE KEY SCAN TIMING

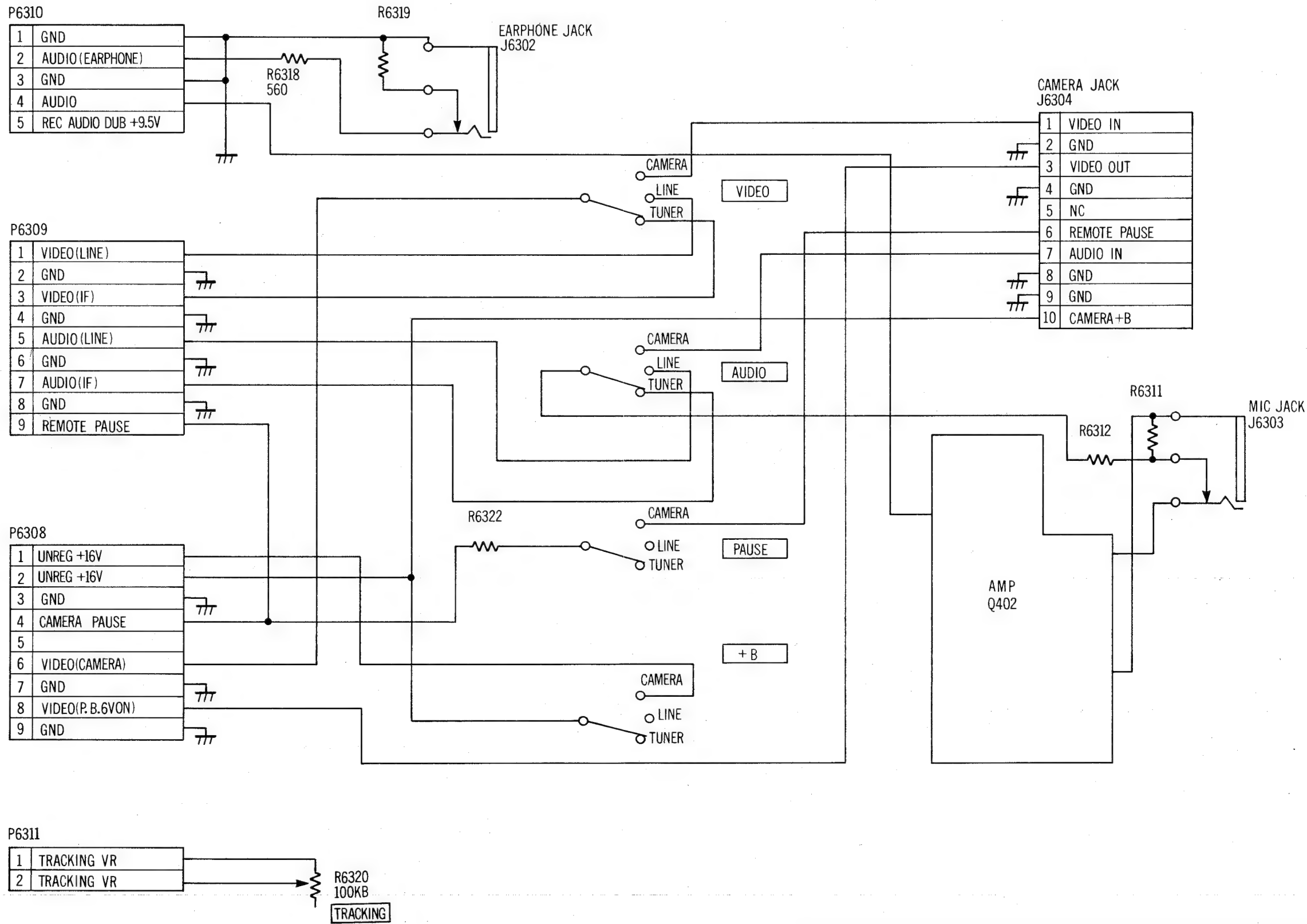
3-11
PAUSE KEY SCAN TIMING



"REC", "AUDIO-DUB" KEY SCAN TIMING

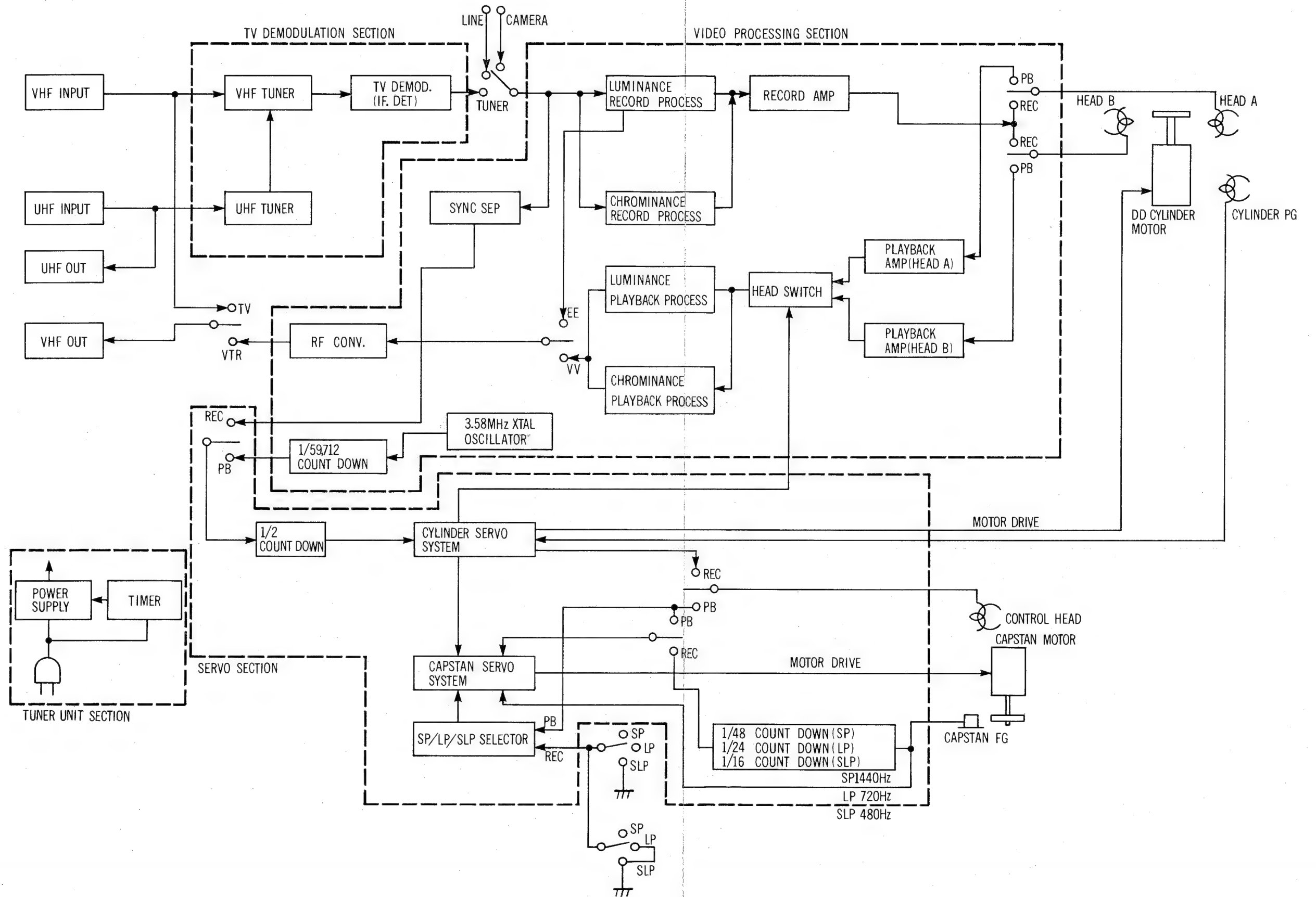


INPUT SELECTOR BLOCK DIAGRAM

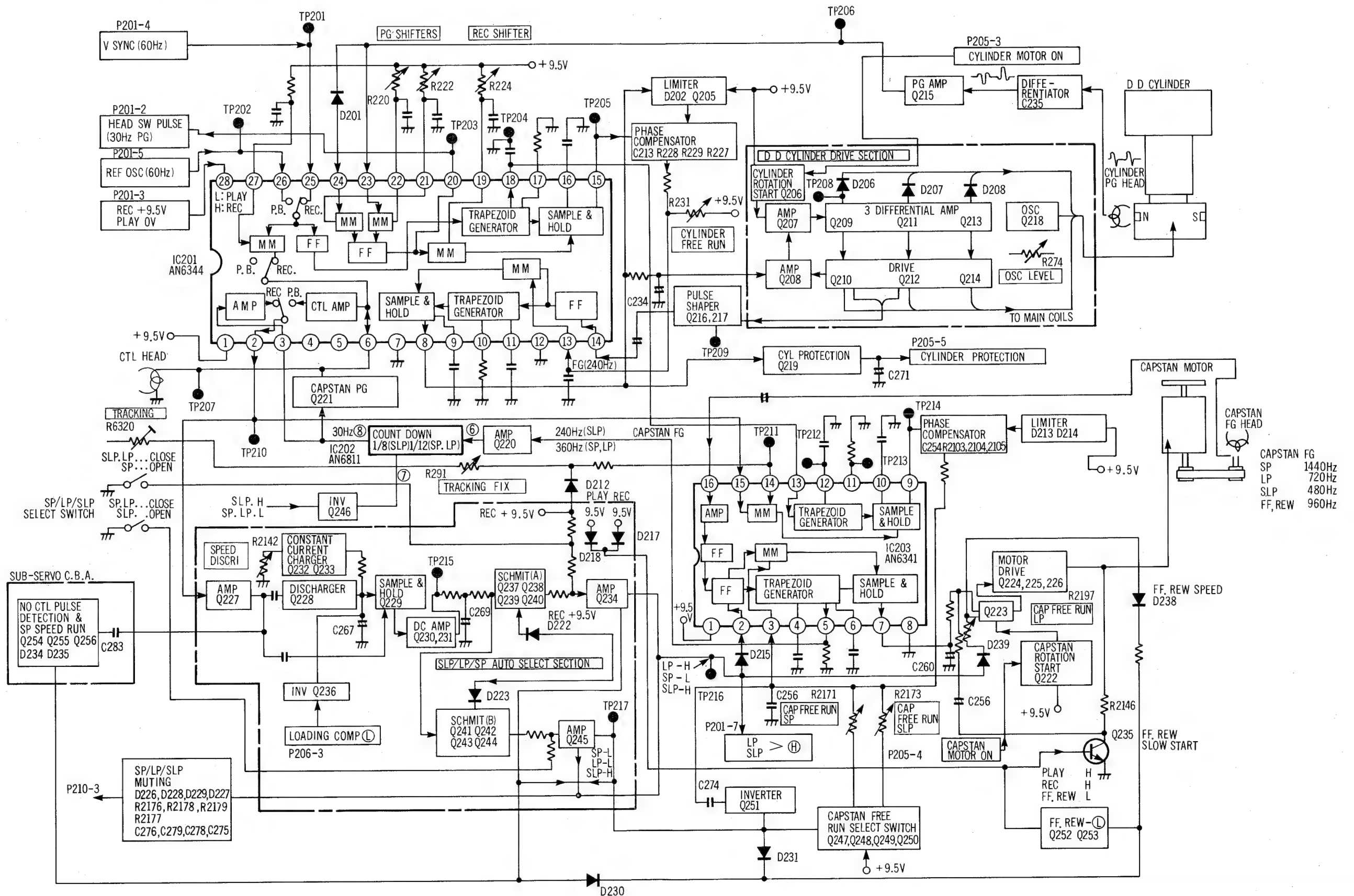


OVERALL BLOCK DIAGRAM

3-13
OVERALL BLOCK DIAGRAM

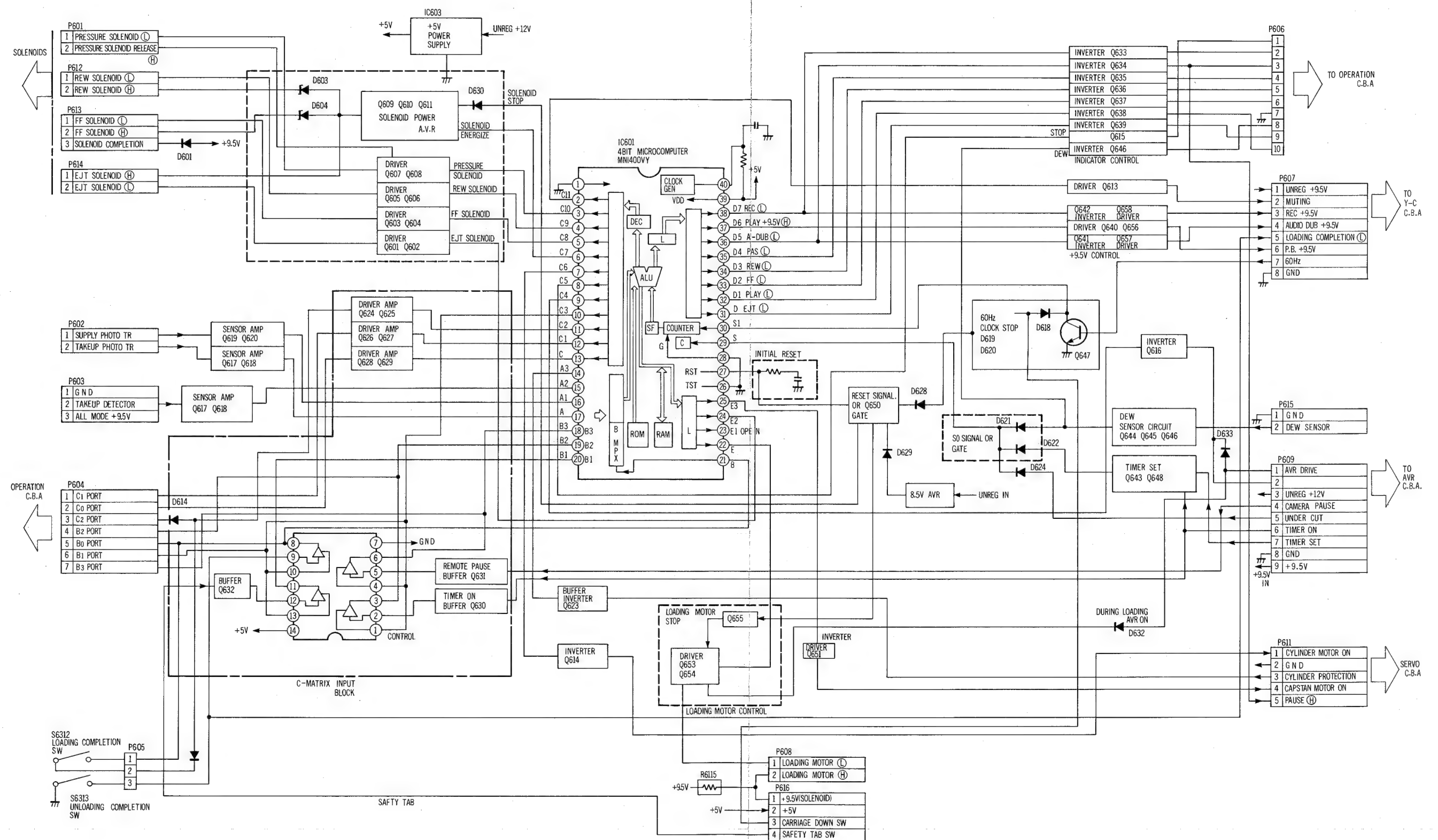


SERVO BLOCK DIAGRAM

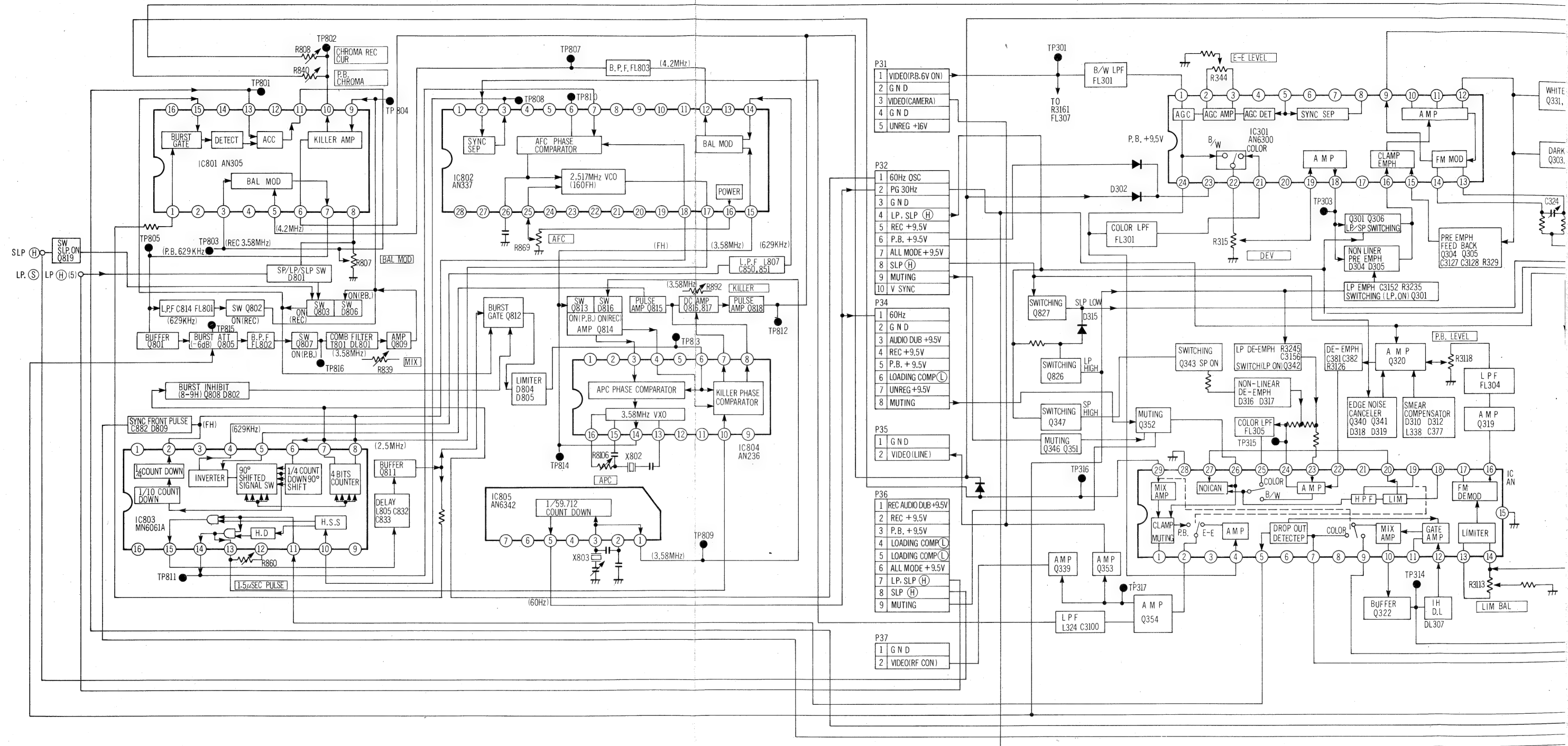


SYSTEM CONTROL BLOCK DIAGRAM

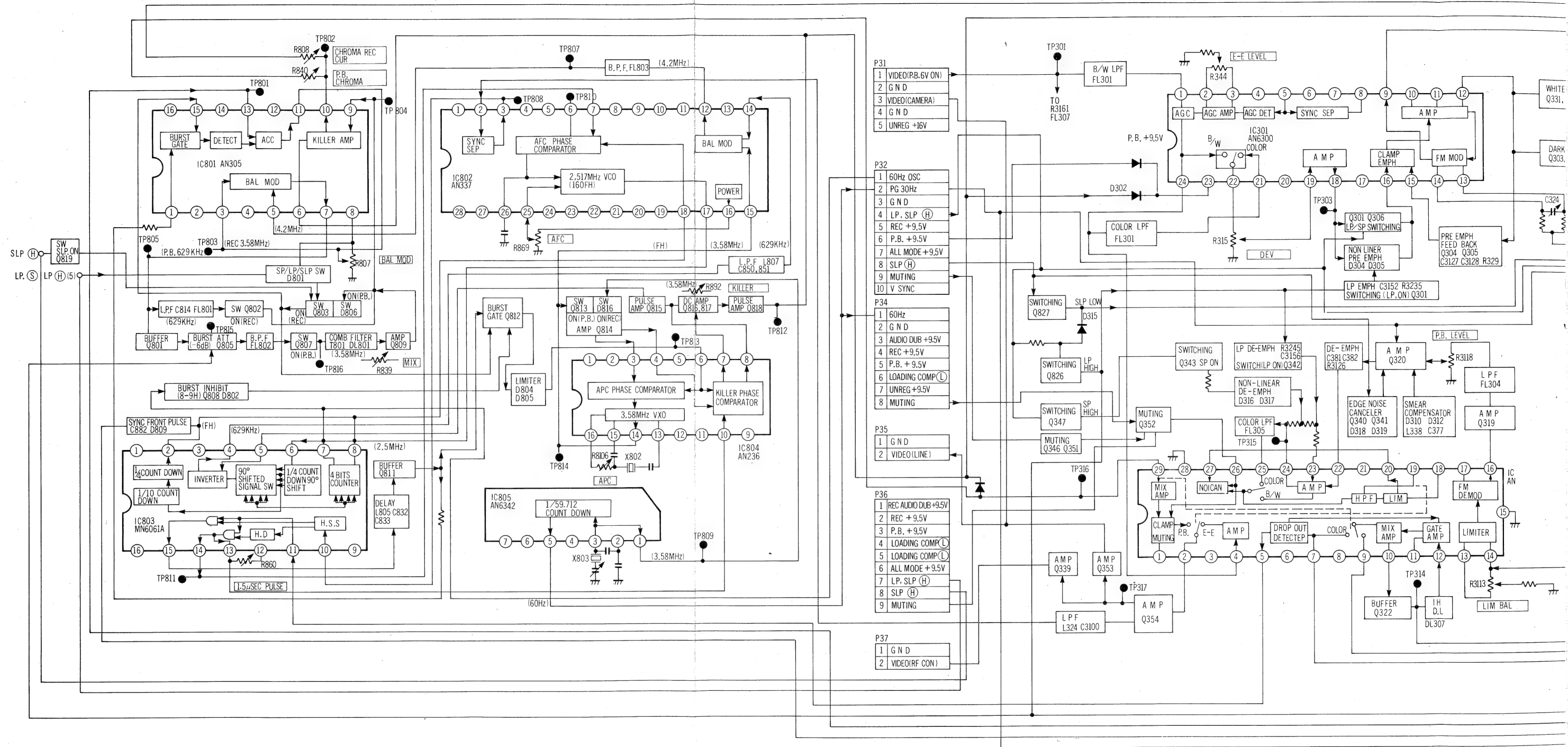
3-15
SYSTEM CONTROL BLOCK DIAGRAM

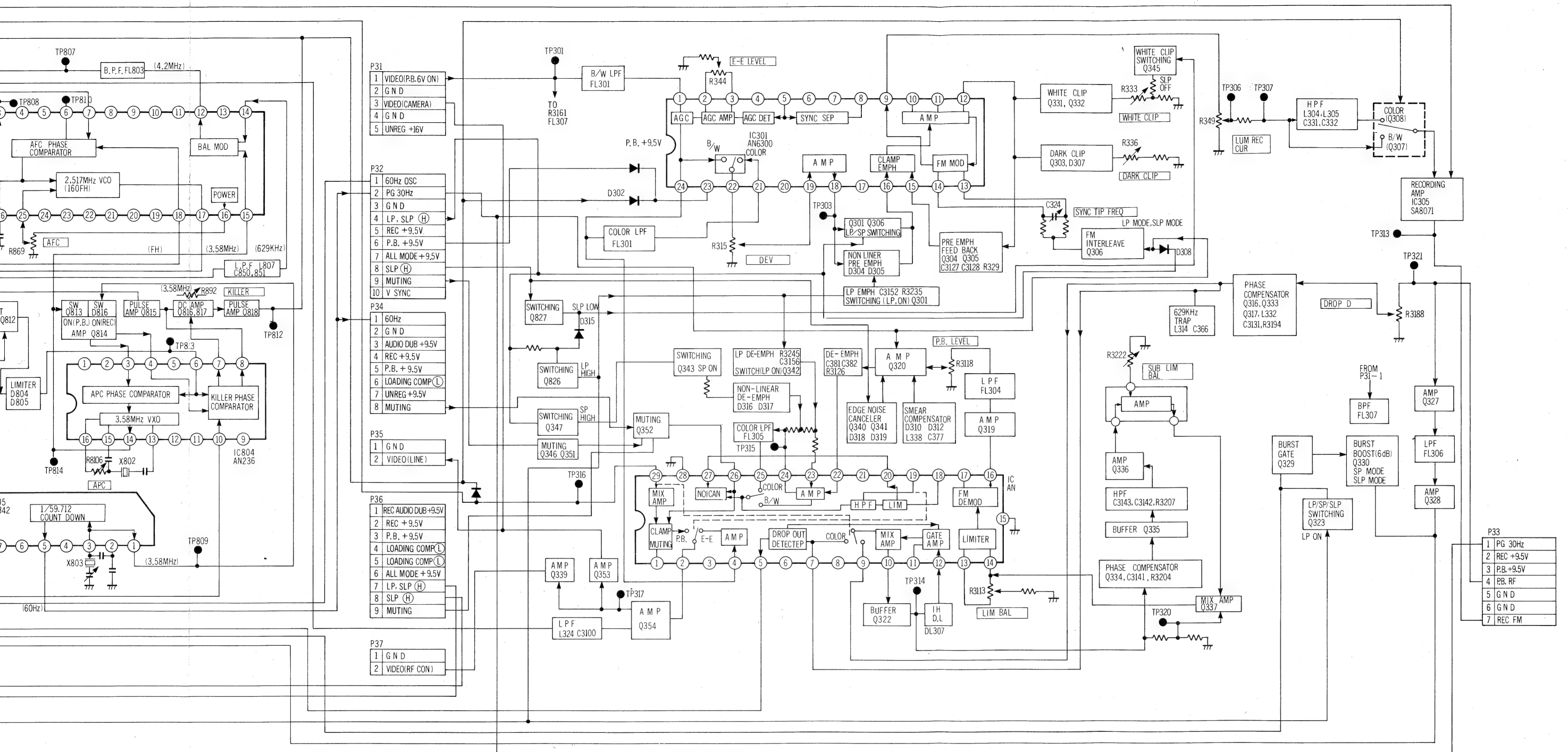


VIDEO PROCESS BLOCK DIAGRAM

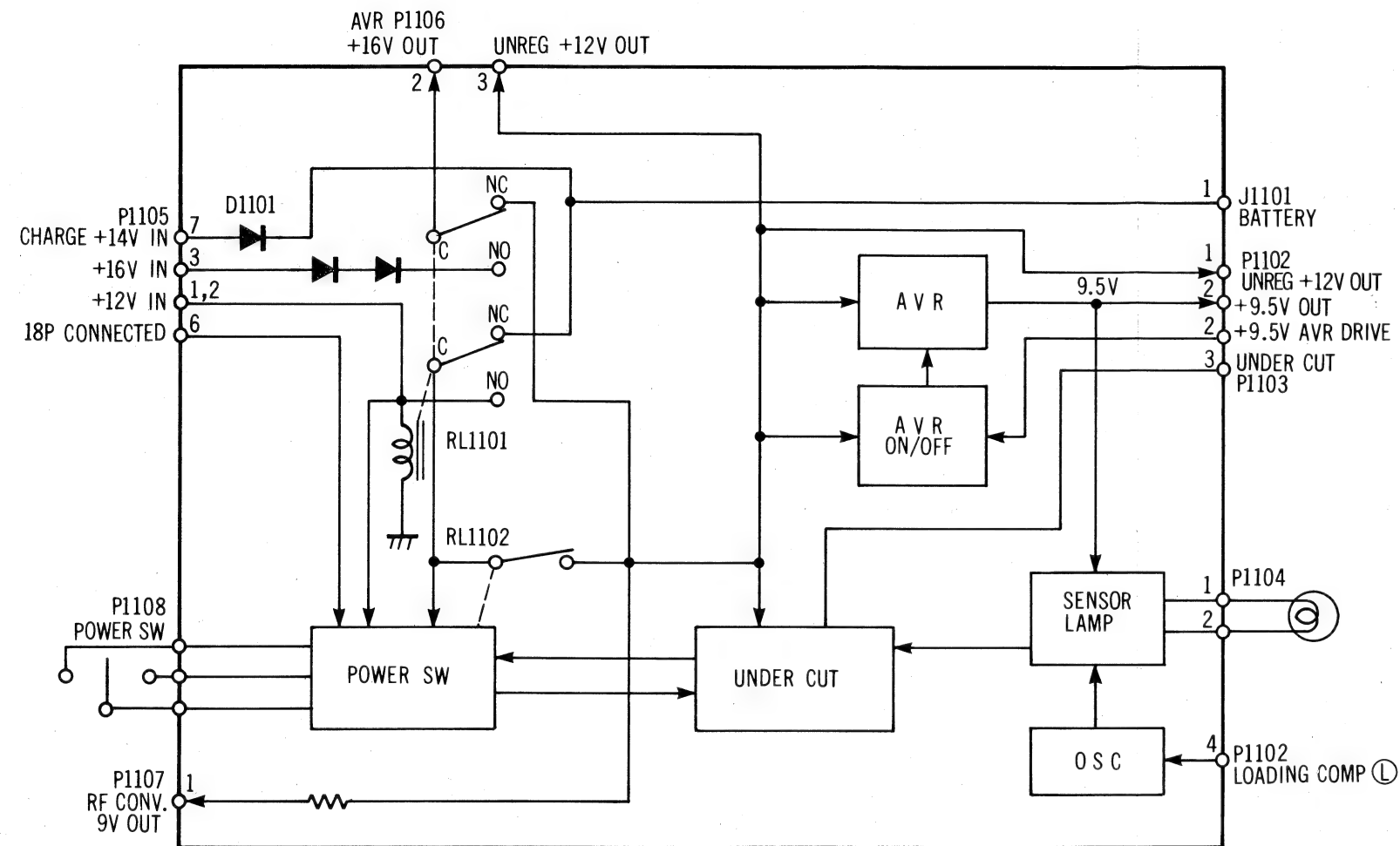


VIDEO PROCESS BLOCK DIAGRAM

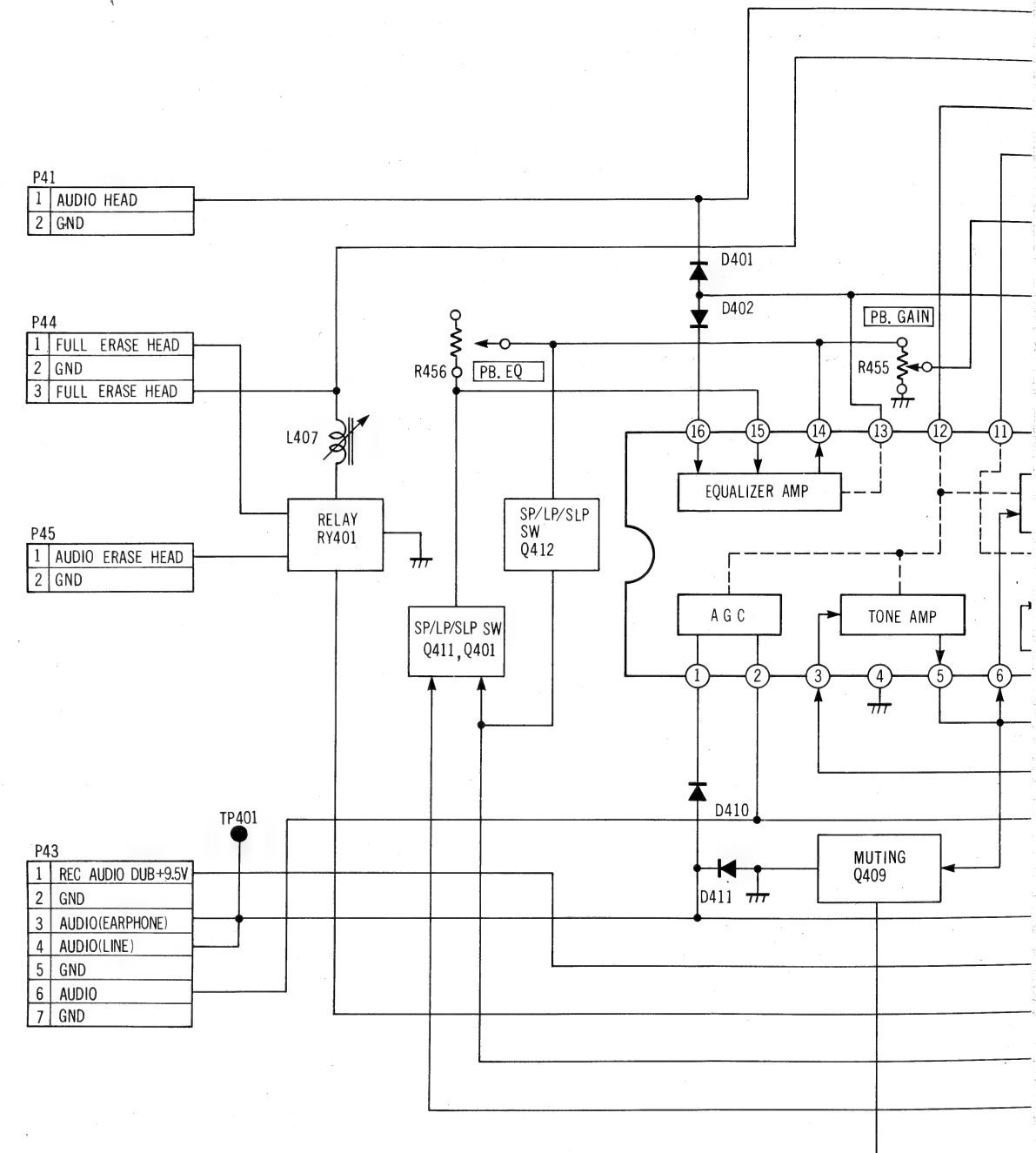




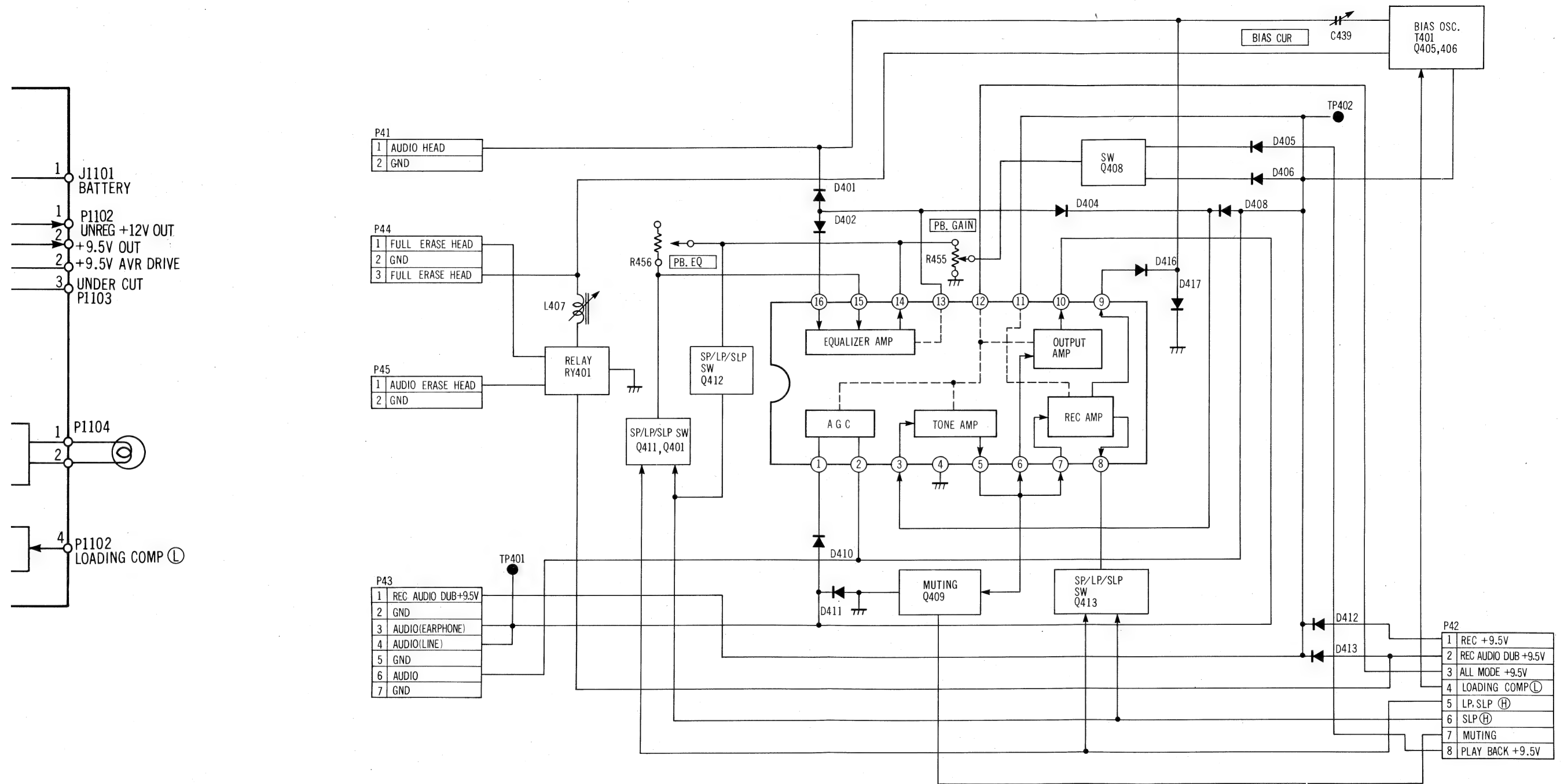
AVR BLOCK DIAGRAM



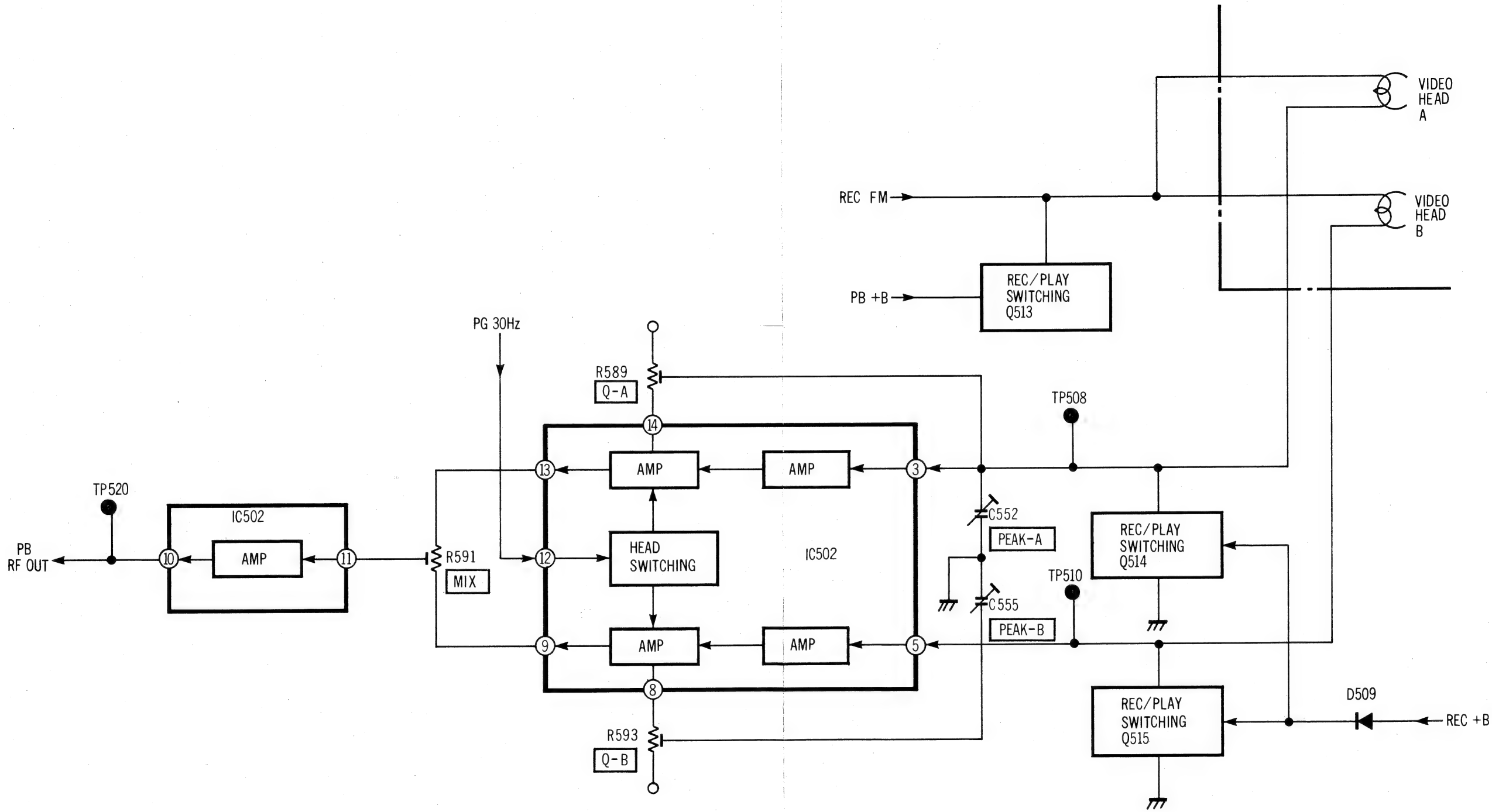
AUDIO BLOCK DIAGRAM



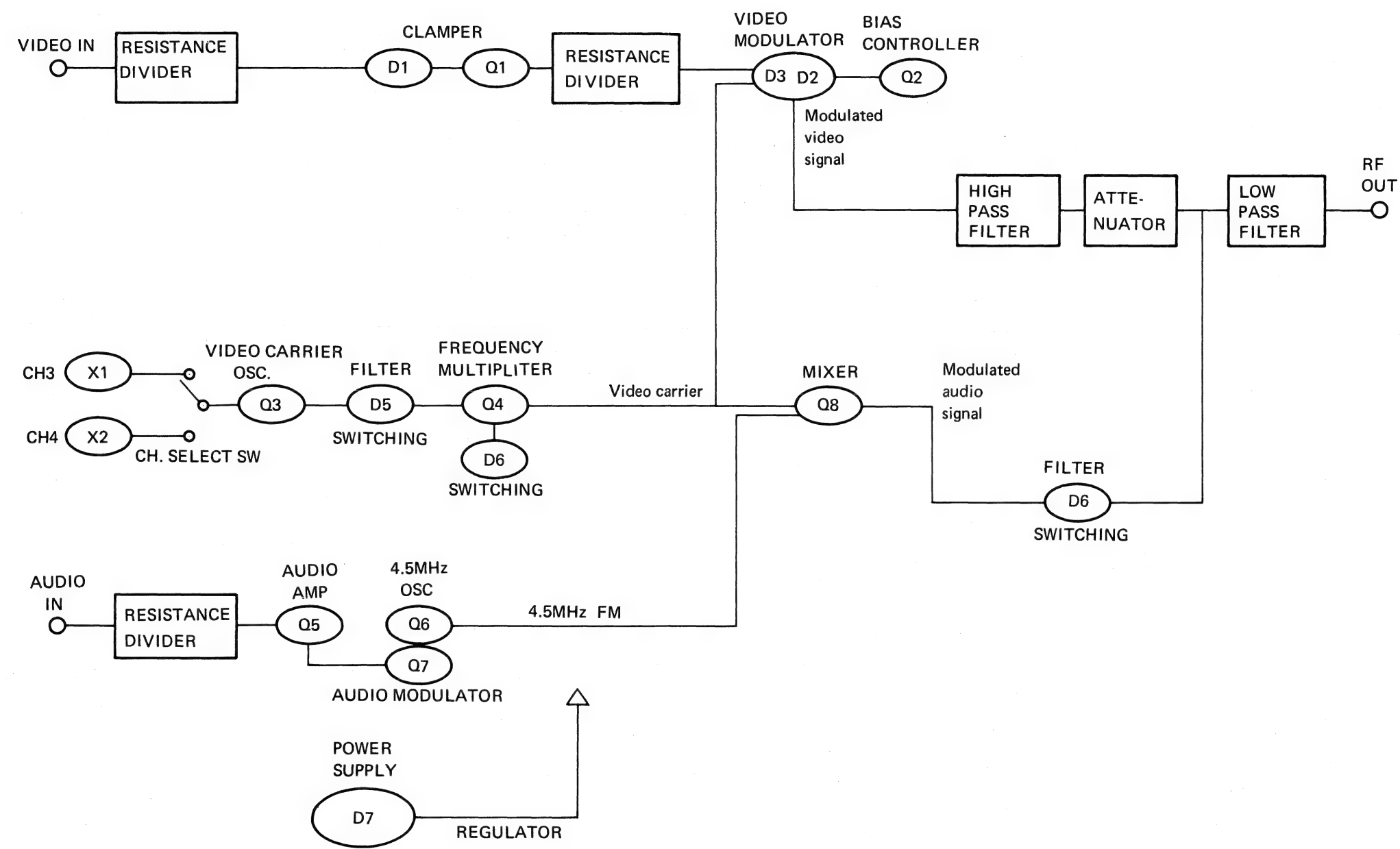
AUDIO BLOCK DIAGRAM



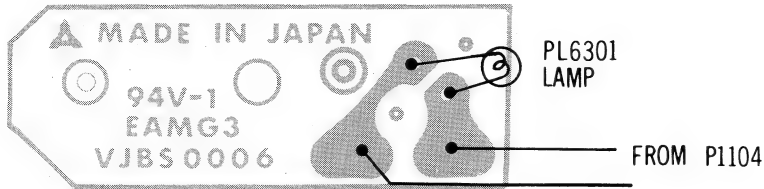
HEAD AMP BLOCK DIAGRAM



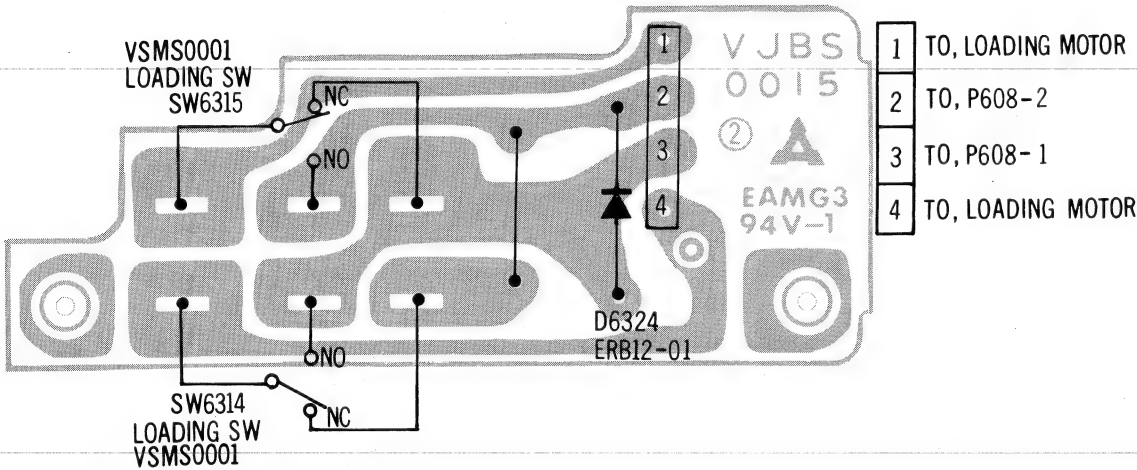
RF CONVERTER BLOCK DIAGRAM



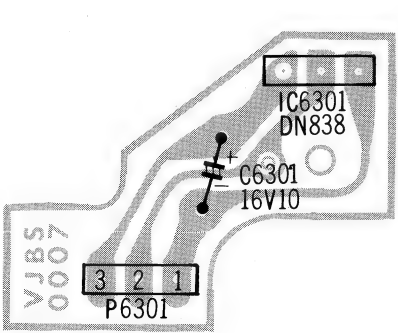
SENSOR LAMP C.B.A (VEPS 0006 A1)



F.F.MICRO SWITCH C.B.A (VEPS 0015 A)



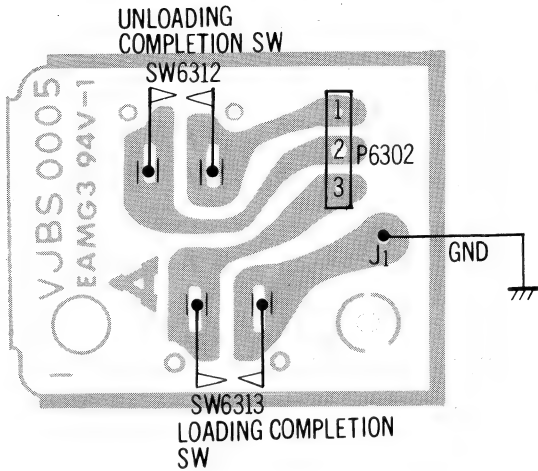
REEL SENSOR C.B.A (VEPS 0007 A)



P6301		
1	GND	
2	TAKEUP DETECTOR	
3	ALL MODE +9.5V	

P6301 (Reel Sensor C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	GND	P603-1 (System Control)
2	Takeup Detector	P603-2 (System Control)
3	All Mode +9.5V	P603-3 (System Control)

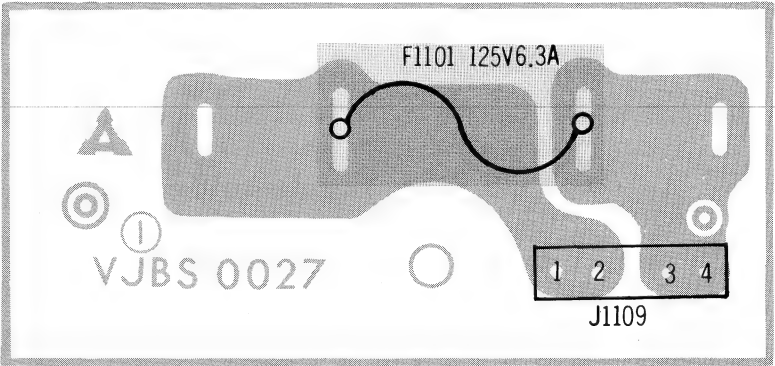
LOADING / UNLOADING
COMPLETION SWITCH C.B.A
(VEPS 0005 A1)



P6302	
1	UNLOADING COMPLETION
2	B+ PORT
3	LOADING COMPLETION

P6302 (Loading/Unloading Completion Switch C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	Unloading COMP	P605-2 (System Control)
2	B+ Port	P605-1 (System Control)
3	Loading COMP	P605-3 (System Control)

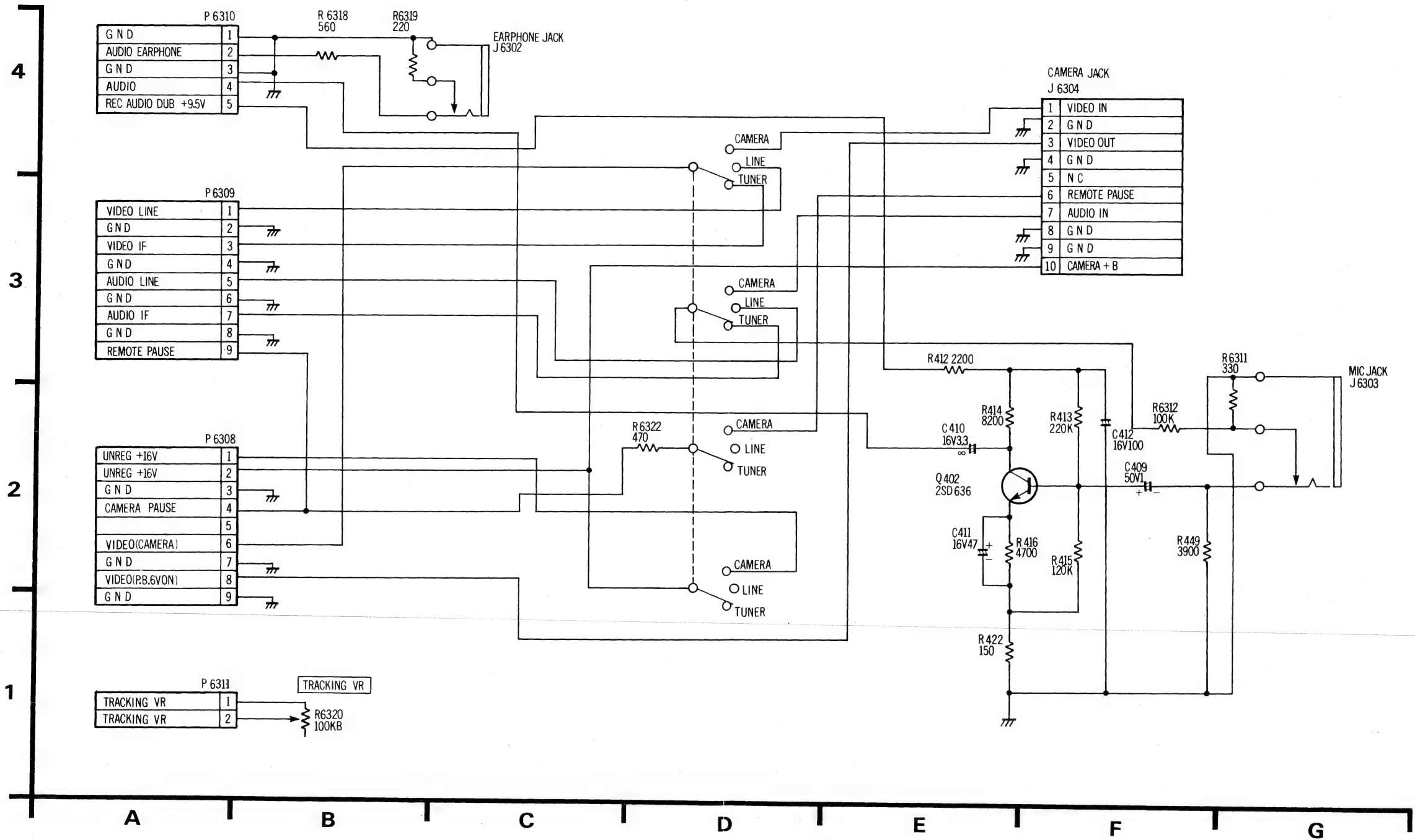
FUSE C.B.A (VEPS 0027 A1)



P1109	
1	BATTERY
2	BATTERY
3	BATTERY +
4	BATTERY +

P1109 (Fuse C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	Battery	Battery Jack
2	Battery	Battery Jack
3	Battery +	J1 (AVR)
4	Battery +	J2 (AVR)

INPUT SELECTOR SCHEMATIC DIAGRAM



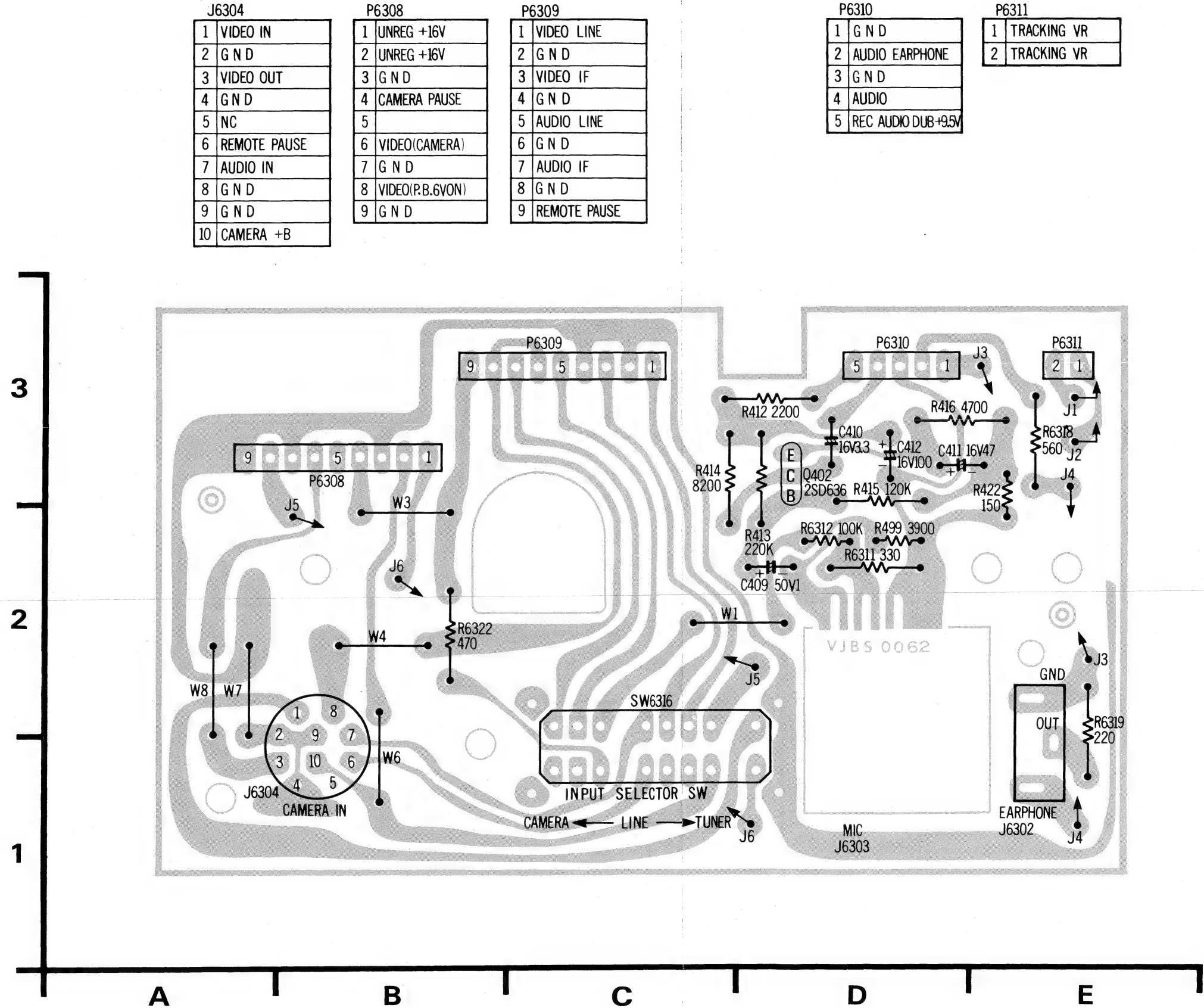
P6308 (Input Selector C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	Unreg +16V	P31-5 (Video Process)
2	Unreg +16V	P1106-3 (AVR)
3	GND	P1106-1 (AVR)
4	Camera Pause	P609-4 (System Control)
5	-	-
6	Video(Camera)	P31-3 (Video Process)
7	GND	P31-4 (Video Process)
8	Video(P.B. 6V ON)	P31-1 (Video Process)
9	GND	P31-2 (Video Process)

P6309 (Input Selector C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	Video (Line)	P6305-8 (18P Connection)
2	GND	P6305-7 (18P Connection)
3	Video (IF)	P6305-1 (18P Connection)
4	GND	P6305-2 (18P Connection)
5	Audio (Line)	P6306-2 (18P Connection)
6	GND	P6306-1 (18P Connection)
7	Audio (IF)	P6305-3 (18P Connection)
8	GND	P6305-4 (18P Connection)
9	Remote Pause	P6304-2 (18P Connection)

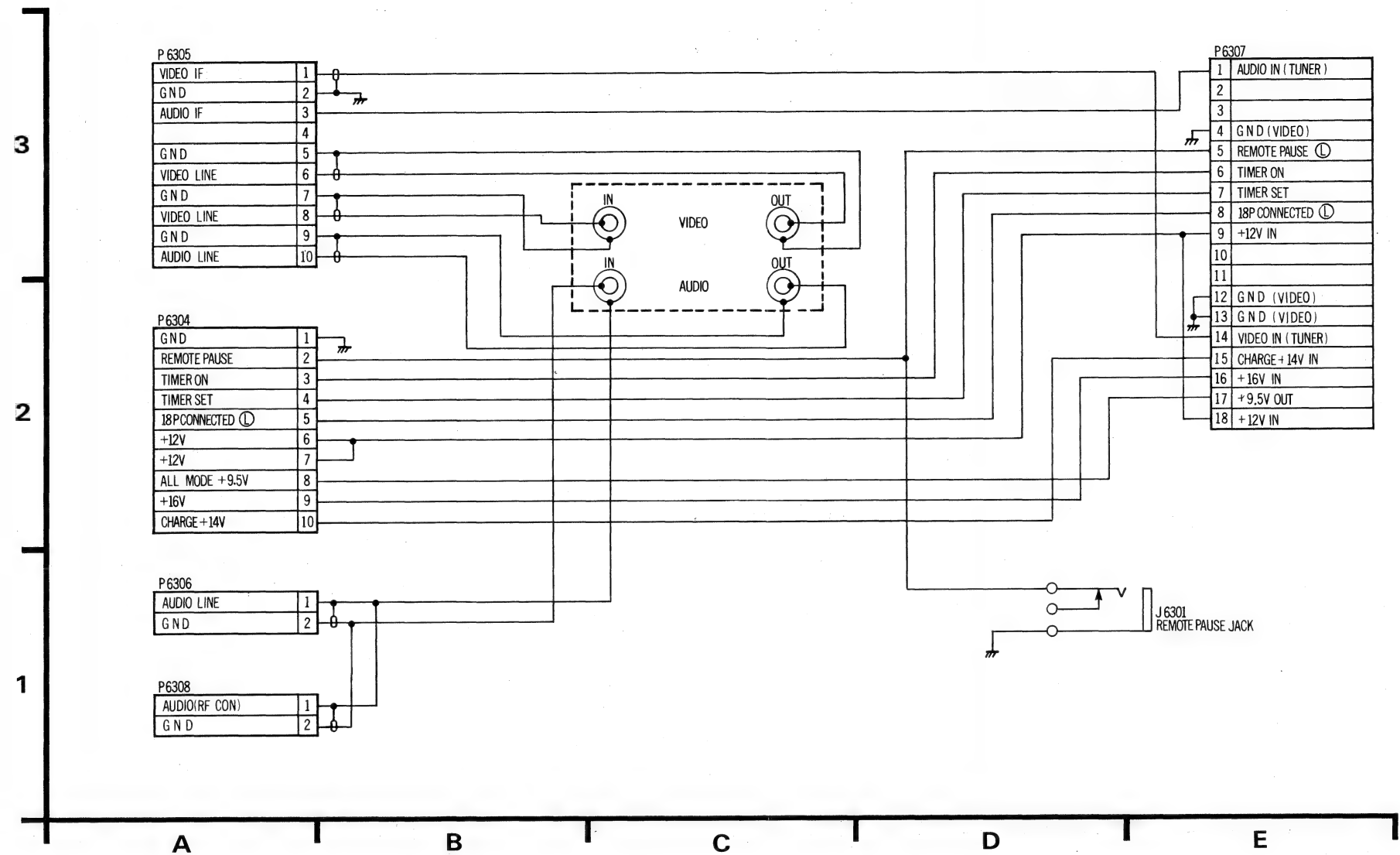
P6310 (Input Selector C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	GND	P43-2 (Audio)
2	Audio (Earphone)	P43-3 (Audio)
3	GND	P43-7 (Audio)
4	Audio	P43-6 (Audio)
5	REC Audio DUB +9.5V	P43-1 (Audio)

P6311 (Input Selector C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	Tracking VR	P203-1 (Servo)
2	Tracking VR	P203-2 (Servo)

INPUT SELECTOR C.B.A (VEKS0213)



18P CONNECTOR SCHEMATIC DIAGRAM



P6304 (18P Connector C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	GND	P1105-4 (AVR C.B.A.)
2	Remoto Pause	P6309-9 (Input Selector)
3	Timer ON	P609-6 (System Control)
4	Timer Set	P609-7 (System Control)
5	18p Connected	P1105-6 (AVR C.B.A.)
6	+12V	P1105-1 (AVR C.B.A.)
7	+12V	P1105-2 (AVR C.B.A.)
8	All Mode +9.5V	P1105-5 (AVR C.B.A.)
9	+16V	P1105-3 (AVR C.B.A.)
10	Charge +14V	P1105-7 (AVR C.B.A.)

P6305 (18P Connector C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	Video IF	P6309-3 (Input Selector)
2	GND	P6309-4 (Input Selector)
3	Audio IF	P6309-7 (Input Selector)
4	GND	P6309-8 (Input Selector)
5	GND	P35-1 (Video Process)
6	Video Line	P35-2 (Video Process)
7	GND	P6309-2 (Input Selector)
8	Video Line	P6309-1 (Input Selector)
9	GND	P43-5 (Audio)
10	Audio Line	P43-4 (Audio)

P6306 (18P Connector C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	GND	P6309-6 (Input Selector)
2	Audio (Line)	P6309-5 (Input Selector)

P6307 (18P Connector C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	Audio IN (Tuner)	
2	-	
3	-	
4	GND (Video)	
5	Remoto Pause	
6	Timer ON	
7	Timer SET	
8	18P Connected	
9	+12V IN	
10	-	
11	-	
12	GND (Video)	
13	GND (Video)	
14	Video IN (Tuner)	
15	Charge +14V IN	
16	+16V IN	
17	+9.5V OUT	
18	+12V IN	

P6308 (18P Connection C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	GND	RF Converter
2	Audio(RF CON)	RF Converter

18P CONNECTOR C.B.A (VEKS0217)

P6308	
1	G N D
2	AUDIO (RF CON)

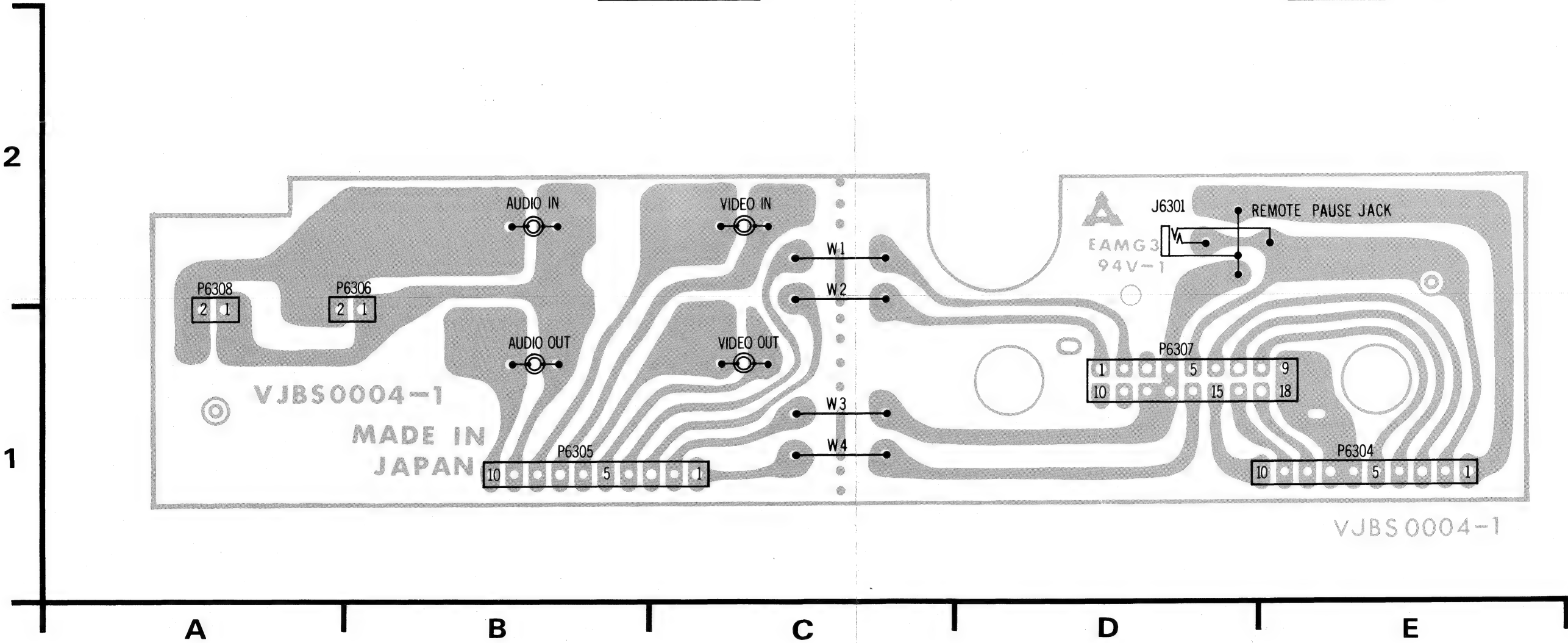
P6306	
1	G N D
2	AUDIO (LINE)

P6305	
1	VIDEO IF
2	G N D
3	AUDIO IF
4	G N D
5	G N D
6	VIDEO LINE
7	G N D
8	VIDEO LINE
9	G N D
10	AUDIO LINE

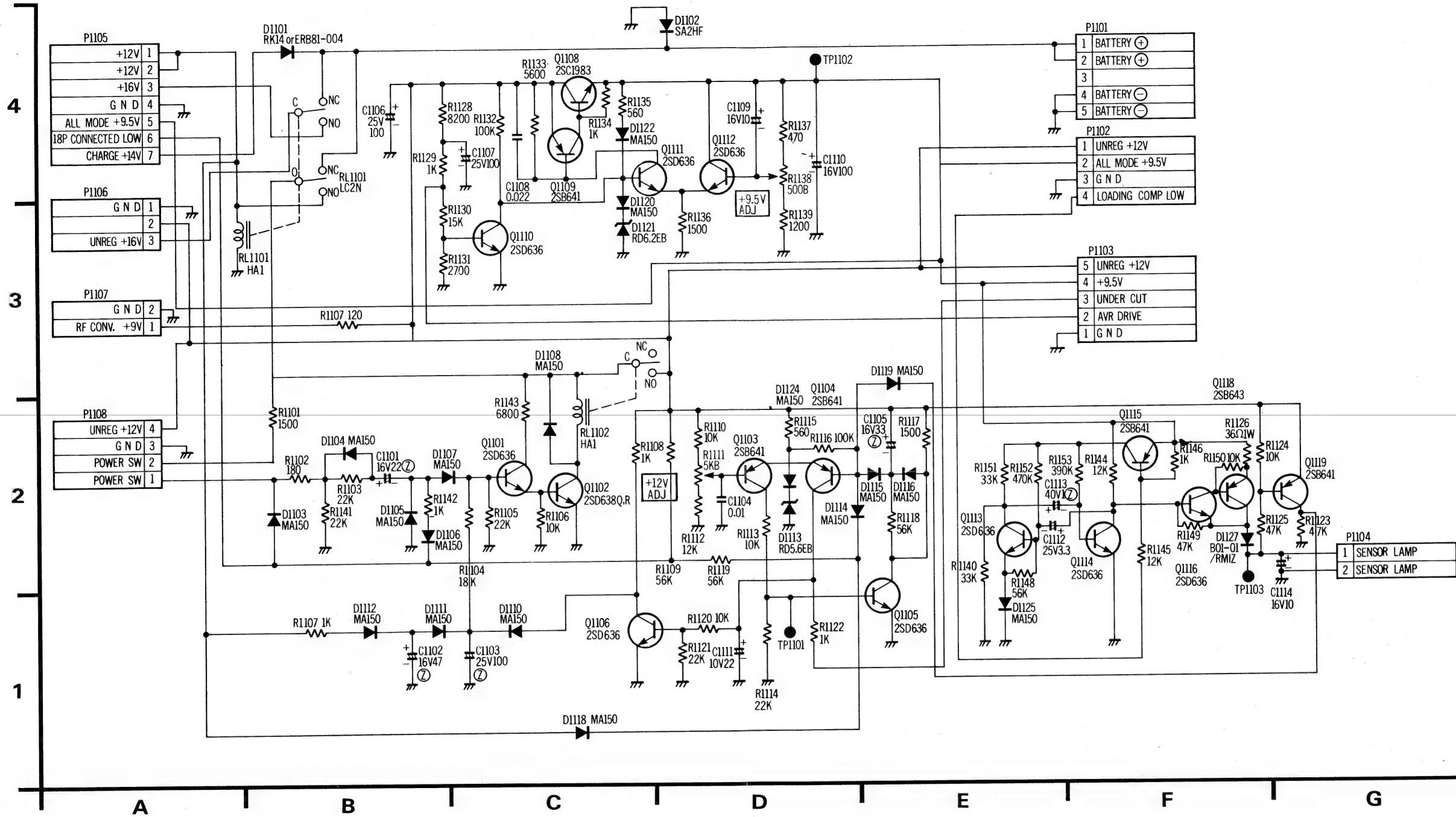
P6307	
1	AUDIO IN(TUNER)
2	
3	
4	G N D(VIDEO)
5	REMOTE PAUSE Ⓛ
6	TIMER ON
7	TIMER SET
8	18P CONNECTED Ⓛ
9	+12V IN

10	
11	
12	G N D(VIDEO)
13	G N D(VIDEO)
14	VIDEO IN(TUNER)
15	CHARG +14V IN
16	+16V IN
17	+9.5V OUT
18	+12V IN

P6304	
1	G N D
2	REMOTE PAUSE
3	TIMER ON
4	TIMER SET
5	18P CONNECTED Ⓛ
6	+12V
7	+12V
8	ALL MODE +9.5V
9	+16V
10	CHARGE +14V



AVR SCHEMATIC DIAGRAM



P1105 (AVR C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
J1	Battery ⊕	P1109-3 (Fuse)
J2	Battery ⊕	P1109-4 (Fuse)
J4	Battery ⊖	Battery Jack (J6341)
J5	Battery ⊖	Battery Jack (J6341)

P1102 (AVR C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	Unreg +12V	P206-1 (Servo)
2	+9.5V	P206-4 (Servo)
3	GND	P206-2 (Servo)
4	Loading COMP	P206-3 (Servo)

P1103 (AVR C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	GND	P609-8 (System Control)
2	AVR Drive	P609-1 (System Control)
3	Under Cut	P609-5 (System Control)
4	+9.5V	P609-9 (System Control)
5	Unreg +12V	P609-3 (System Control)

P1104 (AVR C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	Sensor Lamp	Sensor Lamp (PL6301)
2	Sensor Lamp	Sensor Lamp (PL6301)

P1105 (AVR C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	+12V	P6304-6 (18P Connection)
2	+12V	P6304-7 (18P Connection)
3	+16V	P6304-9 (18P Connection)
4	GND	P6304-1 (18P Connection)
5	All Mode +9.5	P6304-8 (18P Connection)
6	18P Connected	P6304-5 (18P Connection)
7	Charge +14V	P6304-10 (18P Connection)

P1106 (AVR C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	GND	P6308-3 (Input Selector)
2	-	-
3	Unreg +16V	P6308-2 (Input Selector)

P1107 (AVR C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	+9V	RF Converter
2	GND	RF Converter

P1108 (AVR C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	Power SW	J2 (Switch Control)
2	Power SW	J3 (Switch Control)
3	GND	J1 (Switch Control)
4	Unreg +12V	J4 (Switch Control)

AVR C.B.A (VEPS0105 A1)

P1108	
1	POWER SW
2	POWER SW
3	GND
4	UNREG +12V

1	BATTERY (+)
2	BATTERY (+)
3	
4	BATTERY (+)
5	BATTERY (+)

1	GND
2	
3	UNREG +16V

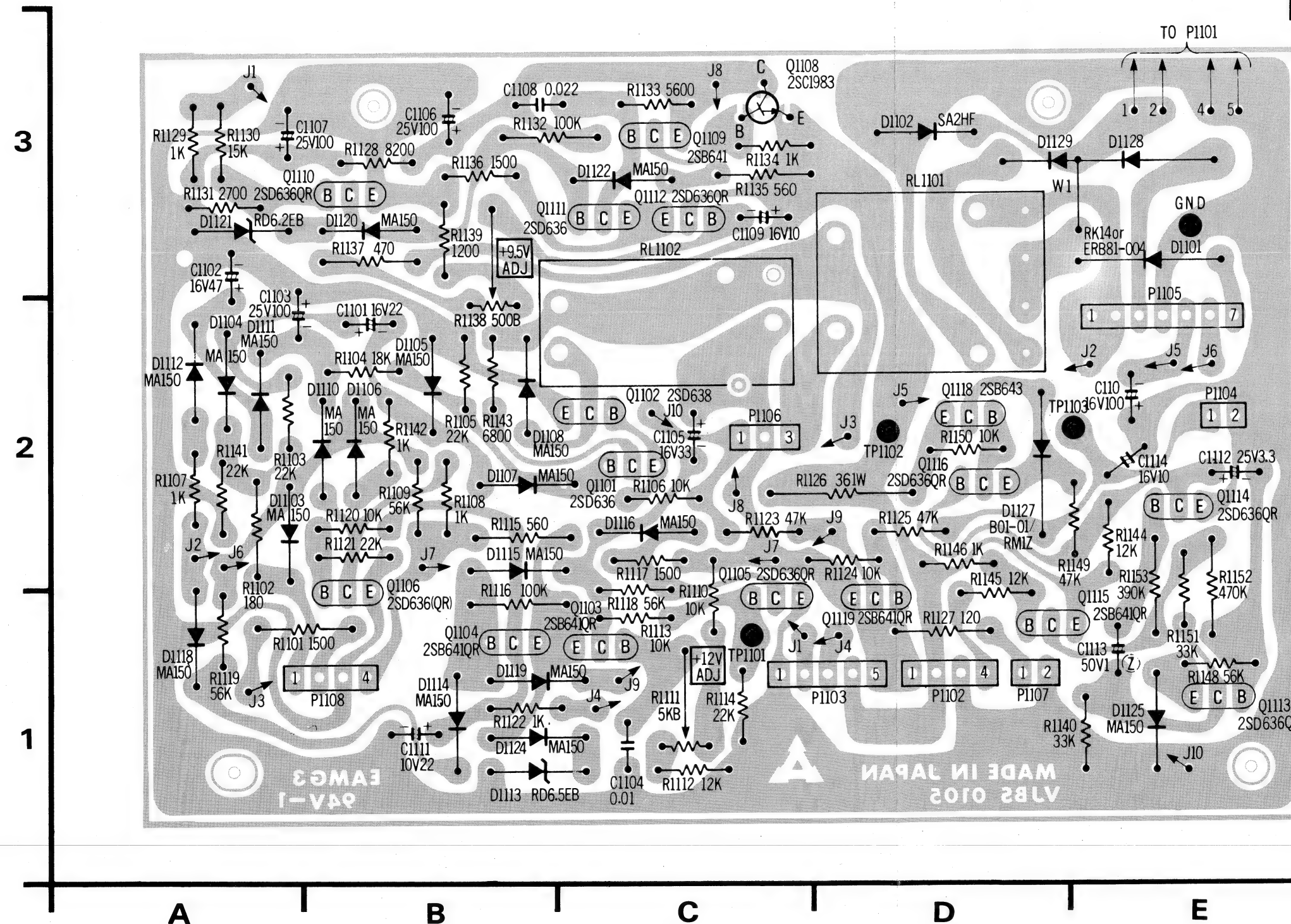
P1103	
1	G N D
2	AVR DRIVE
3	UNDER CUT
4	+9.5V
5	UNREG +12V

1	UNREG +12V
2	ALL MODE+9.5V
3	GND
4	LOADING COMP (L)

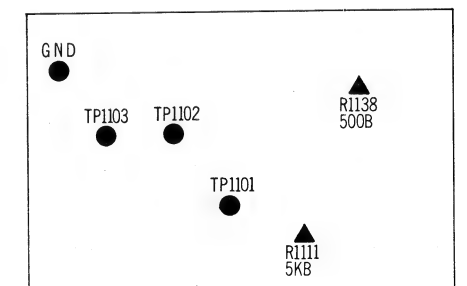
1	RF CONV.+9V
2	G N D

P1104	
1	SENSOR LAMP
2	SENSOR LAMP

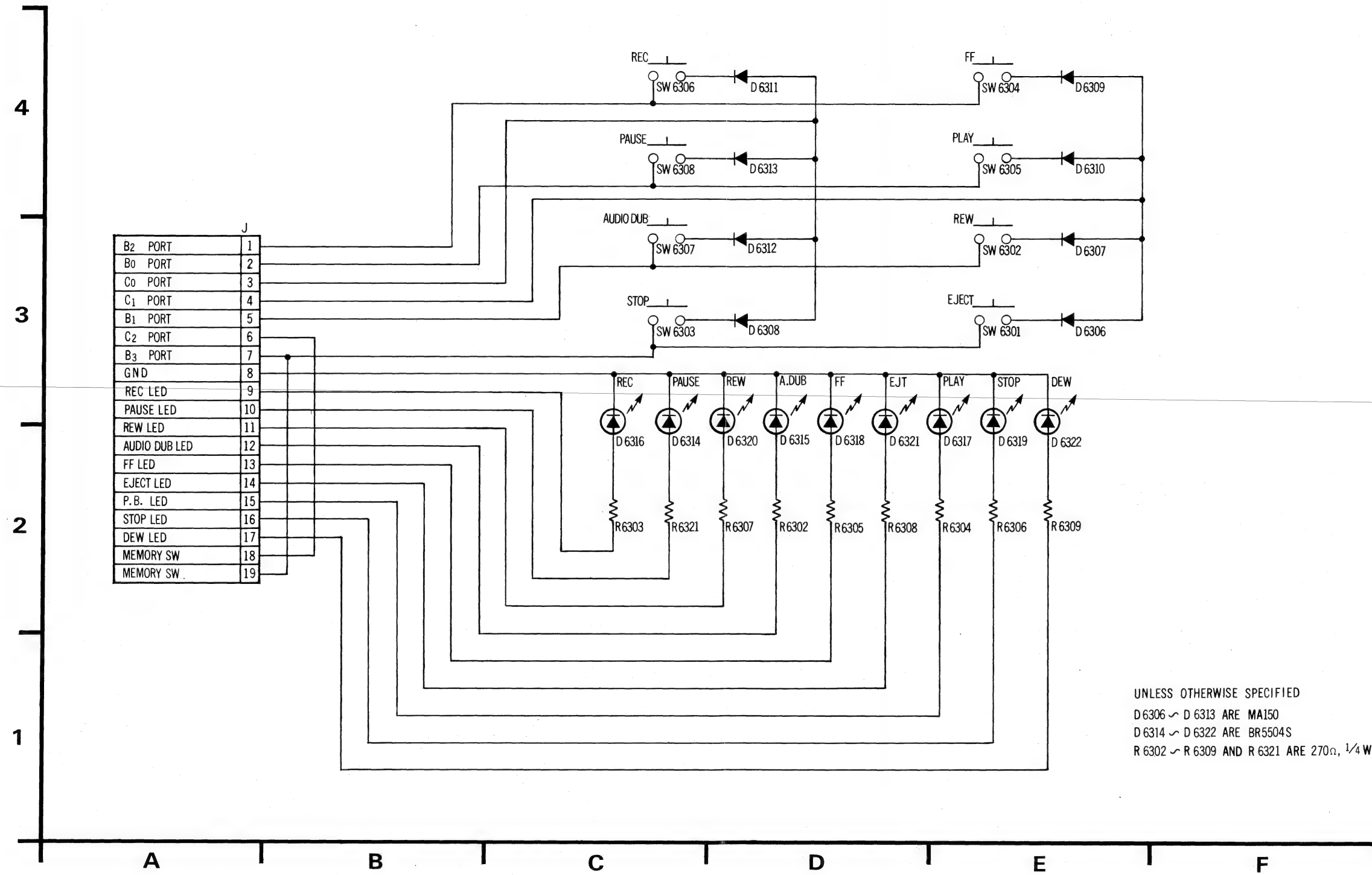
P1105	
1	+12V
2	+12V
3	+16V
4	G N D
5	ALL MODE +9.5V
6	18P CONNECTED (L)
7	CHARGE +14V



AVR CIRCUIT	
Q1101	C-2
Q1102	C-2
Q1103	C-1
Q1104	B-1
Q1105	C-1
Q1106	B-1
Q1108	C-3
Q1109	C-3
Q1110	B-3
Q1111	C-3
Q1112	C-3
Q1113	E-1
Q1114	E-2
Q1115	D-1
Q1116	D-2
Q1118	D-1
Q1119	D-1



KEY BOARD SCHEMATIC DIAGRAM



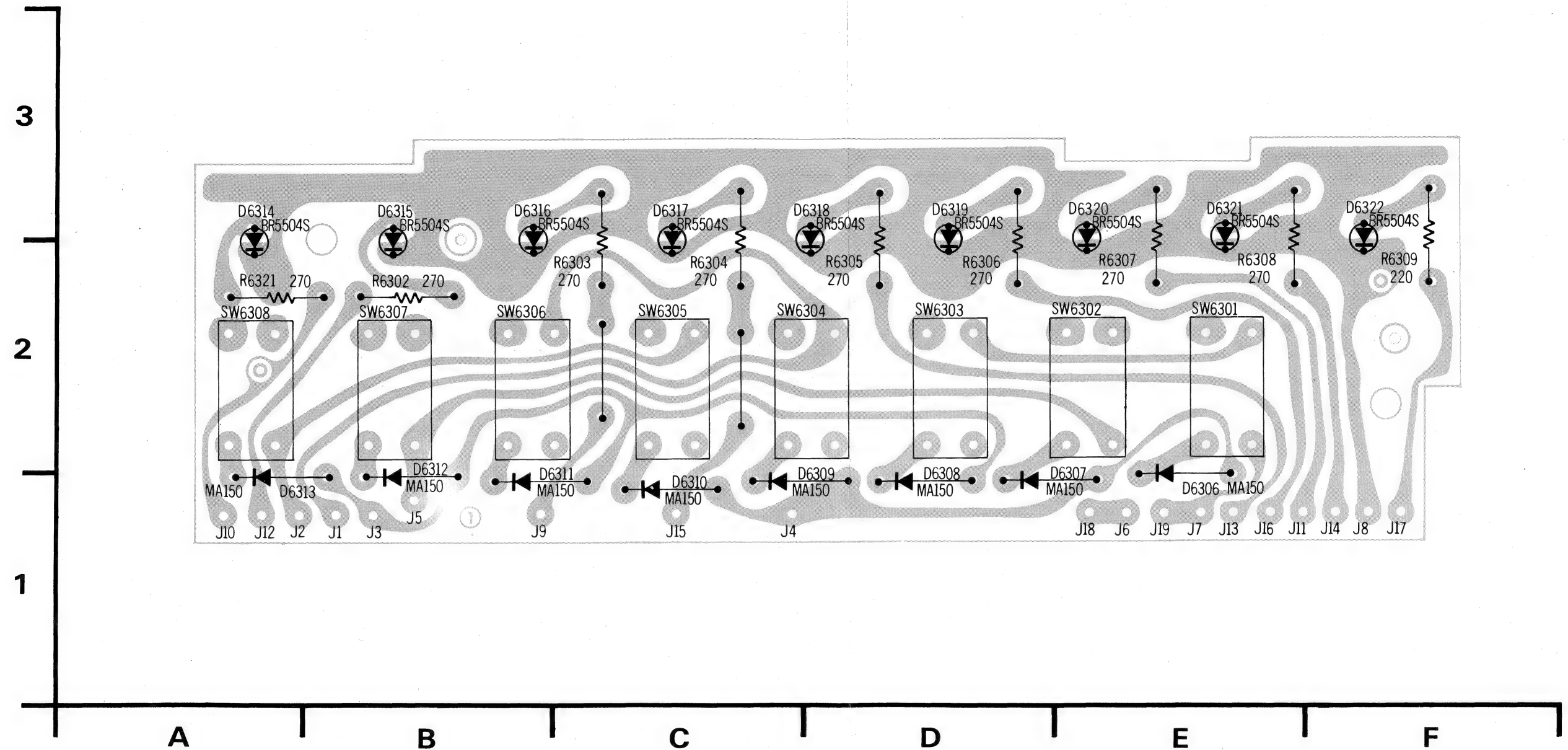
UNLESS OTHERWISE SPECIFIED
D6306 ~ D 6313 ARE MA150
D 6314 ~ D 6322 ARE BR5504S
R 6302 ~ R 6309 AND R 6321 ARE 270 Ω , 1/4 W

(Key Board C.B.A.)		
	SIGNAL NAME	DESTINATION
J1	B2 Port	P604-4 (System Control)
J2	B0 Port	P604-5 (System Control)
J3	C0 Port	P604-2 (System Control)
J4	C1 Port	P604-1 (System Control)
J5	B1 Port	P604-6 (System Control)
J6	C2 Port	P604-3 (System Control)
J7	B3 Port	P604-7 (System Control)

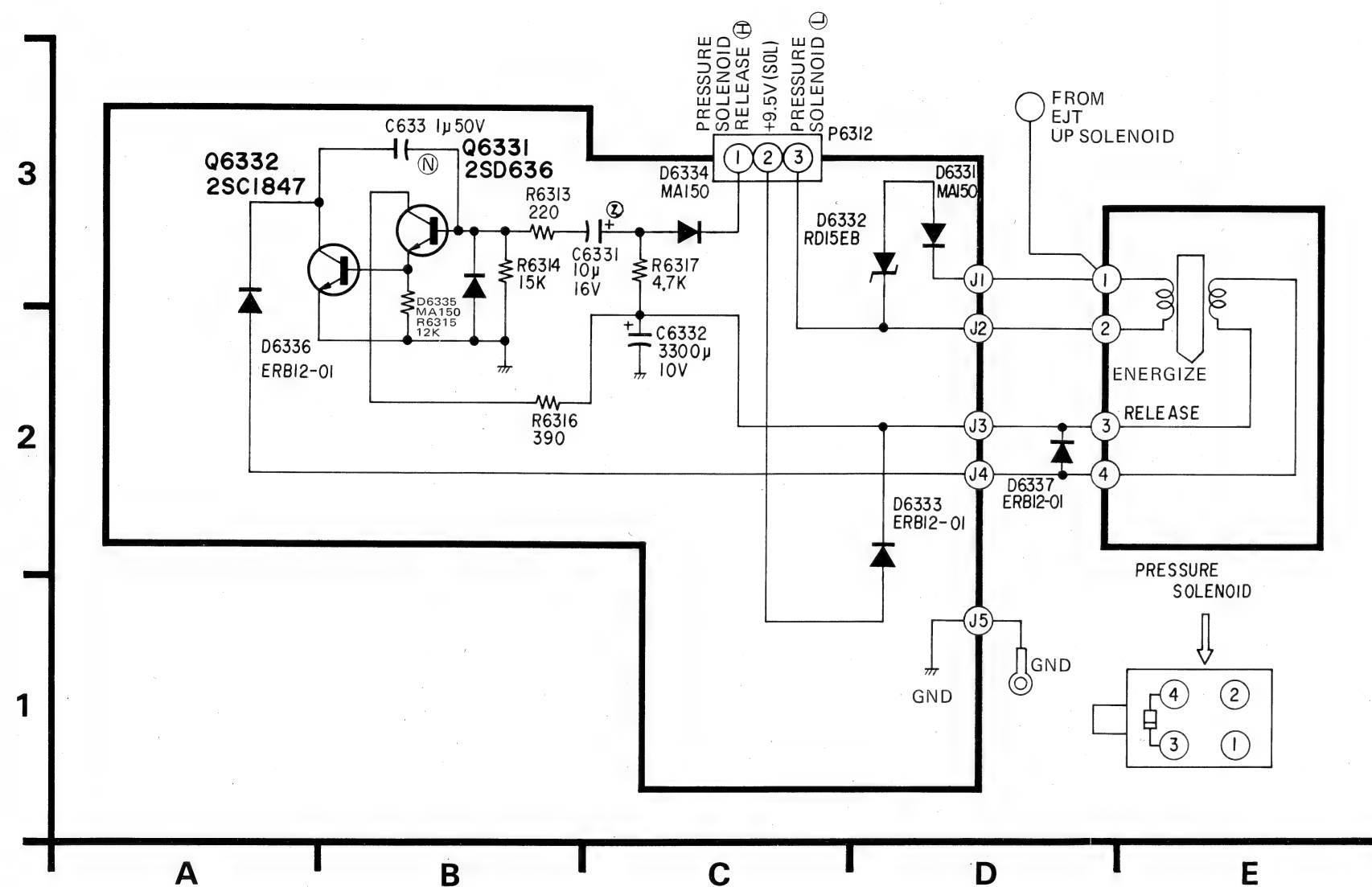
(Key Board C.B.A.)		
	SIGNAL NAME	DESTINATION
J8	GND	P606-7 (System Control)
J9	REC LED	P606-2 (System Control)
J10	Pause LED	P606-4 (System Control)
J11	REW LED	P606-5 (System Control)
J12	Audio DUB LED	P606-3 (System Control)
J13	FF LED	P606-10 (System Control)
J14	EJT LED	P606-9 (System Control)
J15	P.B. LED	P606-6 (System Control)
J16	Stop LED	P606-1 (System Control)
J17	DEW LED	P606-8 (System Control)

(Key Board C.B.A.)		
	SIGNAL NAME	DESTINATION
J18	Memory SW	J7 (Switch Control)
J19	Memory SW	J6 (Switch Control)

KEY BOARD C.B.A (VEPS0001 A)



PRESSURE SOLENOID DRIVE SCHEMATIC DIAGRAM



(Pressure Solenoid C.B.A.)		
	SIGNAL NAME	DESTINATION
J1	Latch SOL	Latch
J2	Latch SOL	Latch
J3	Release SOL	P. SOL (SL6301)
J4	Release SOL	P. SOL (SL6301)
J5	GND	ERB12-01 x 6

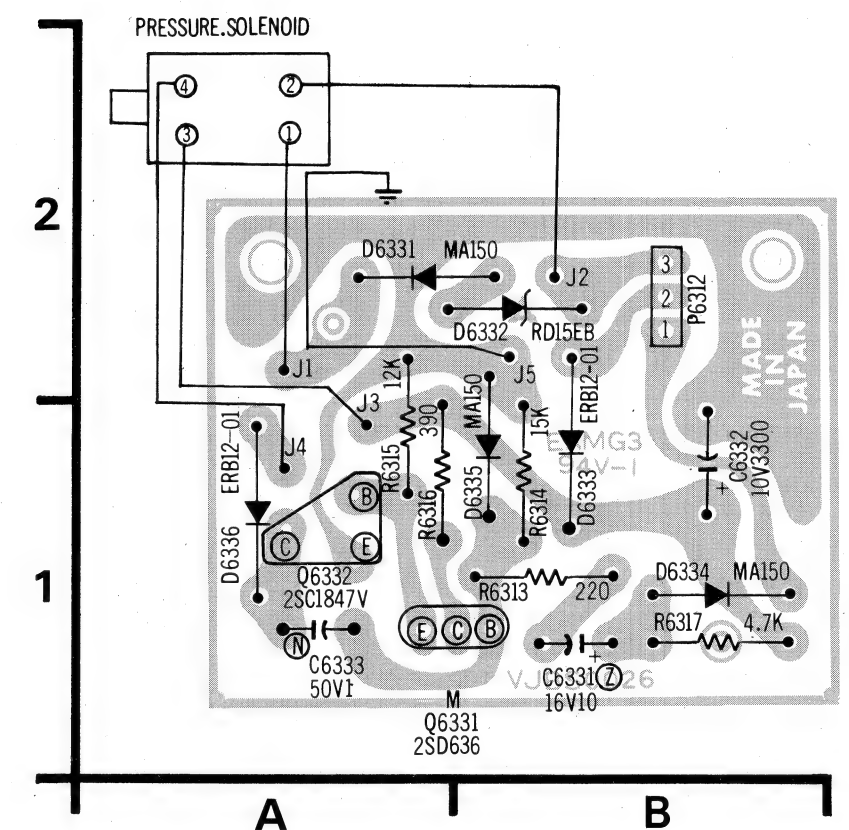
P6312 (Pressure Solenoid C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	Pressure SOL REL (H)	P601-2 (System Control)
2	+9.5V (SOL)	P616-1 (System Control)
3	Pressure SOL (L)	P601-1 (System Control)

3-29

KEY BOARD C.B.A

PRESSURE SOLENOID DRIVE
SCHEMATIC DIAGRAM

PRESSURE SOLENOID DRIVE C.B.A (VEPS 0026 A1)



P6312

1	PRESSURE SOL REL (H)
2	+9.5V (SOL)
3	PRESSURE SOL (L)

PRESSURE SOLENOID OPERATION CIRCUIT	
Q6331	A-1
Q6332	A-1

3-30

SYSTEM CONTROL SCHEMATIC DIAGRAM

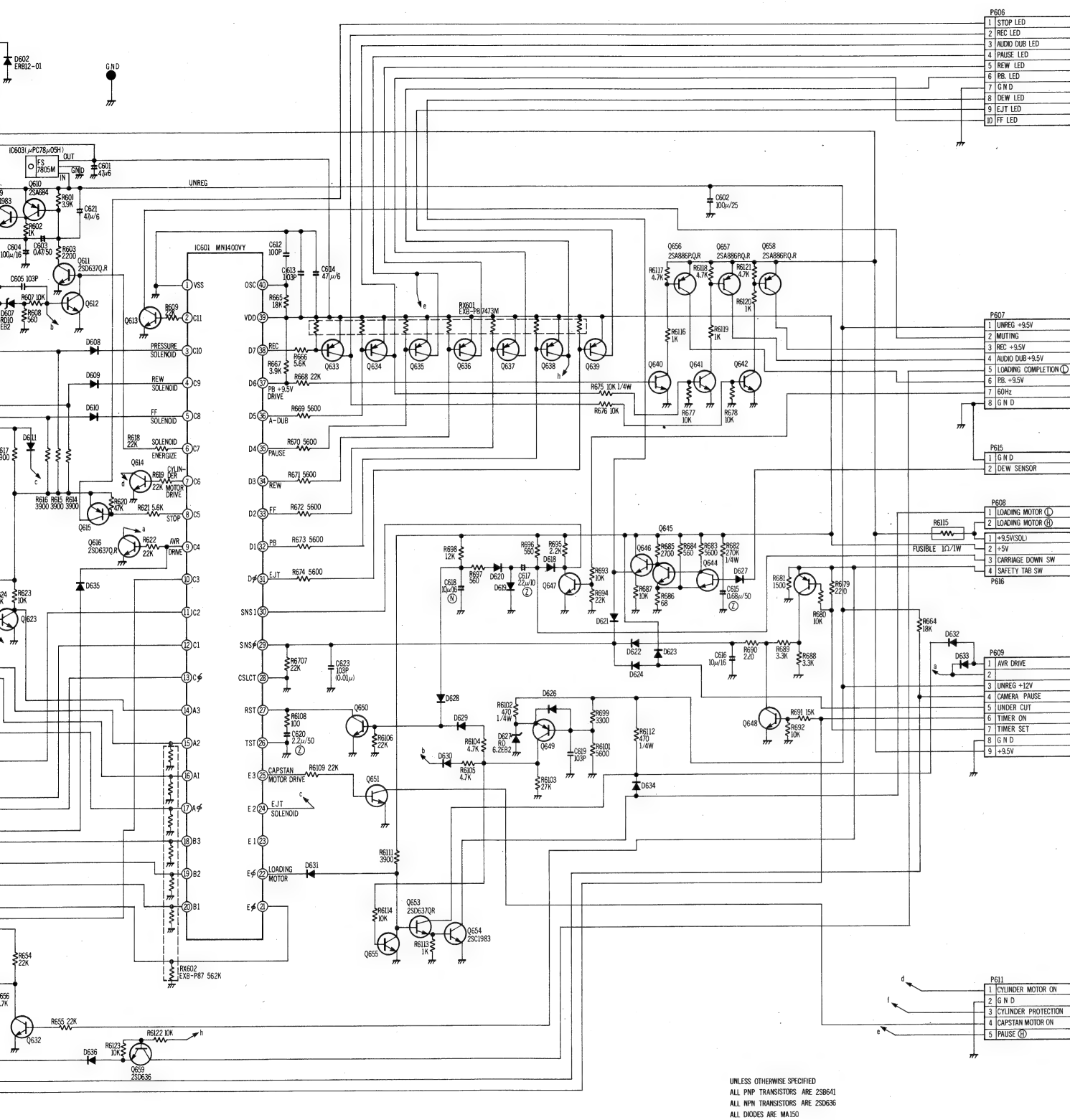
VOLTAGE CHART FOR ICs & TRs

unit: volt

IC REF. NO.		IC601																													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
MODE		0	0	0.1	0.1	0	0	0	0	0.2	0	0	0.2	0.3	0	0	4.9	4.9	0	0.2	0	0.2	0.2	0.1	0.1	0.1	0	4.9	0	0	2.3
STOP		0	3.9	4.9	0.1	0.1	0	3.9	4.9	3.9	0.2	0	0.1	0.3	4.9	4.9	4.9	4.9	0	0.1	0	0	0.2	0	0.2	4.0	0	4.9	0	0	2.2
PLAY		0	0	0.1	0.1	4.9	0	0	4.9	3.9	0.1	0	0.2	0.3	0	4.9	4.9	4.9	0	0.1	0	0.1	0.2	0	0.2	4.0	0	4.9	0	0	2.2
FF		0	0	0.1	4.9	0.1	0	0	4.9	3.9	0.1	0.1	0.2	0.2	0	4.9	4.9	4.9	0	0	0	0.2	0.2	0	0.2	4.0	0	4.9	0	0	2.3
REW		0	3.9	4.9	0.1	0.1	0	3.9	4.9	3.9	0.2	0	0	0.2	4.9	4.9	4.9	0	0.2	0	0	0.2	0.1	0.2	4.0	0	4.9	0	0	0	2.2
REC																															

IC REF. NO.		IC601														IC602														IC603			
		31	32	33	34	35	36	37	38	39	40	1	2	3	4	5	6	7	8	9	10	11	12	13	14	IN	OUT						
MODE		4.9	4.9	4.9	0	4.9	4.9	0.2	4.9	0	0	0.2	4.9	0.2	0.2	0	0	0	0.2	4.9	0.2	0	0	0.2	4.9	12	4.9						
STOP		4.9	4.9	4.9	0	4.9	4.9	0.2	4.9	0	0	0.2	4.9	0.2	0.2	0	0	0	0.2	4.9	0.2	0	0	0.2	4.9	12	4.9						
PLAY		4.9	0.2	4.9	4.9	4.9	4.9	4.5	4.9	4.9	1.7	0.2	4.9	0.1	0.2	0	0	0	0	0.6	0	0	0	0.2	4.9	12	4.9						
FF		4.9	4.9	0.1	4.9	4.9	4.9	0.2	4.9	4.9	0.7	0.1	4.9	0.1	0.1	0	0	0	0.1	4.9	0.1	0	0	0.1	4.9	12	4.9						
REW		4.9	4.9	4.9	0.1	4.9	4.9	0.2	4.9	0	1.7	0.1	4.9	0.1	0.1	0	0	0	0.2	4.9	0.1	0	0	0.1	4.9	12	4.9						
REC		4.9	0.1	4.9	4.9	4.9	4.9	0.2	0.1	4.9	1.7	0.2	4.9	0.2	0.2	0	0	0	0	0.6	0.2	0	0	0.2	4.9	12	4.9						

TR. REF. NO.		Q601			Q602			Q603			Q604			Q605			Q606			Q607			Q608			Q609			Q610				
		E	C	B	E	C	B	E	C	B	E	C	B	E	C	B	E	C	B	E	C	B	E	C	B	E	C	B					
MODE		0	0	0.1	0.2	0.2	0.7	0	0	0.1	0	4.8	0.1	0	0	0.1	0.1	0.2	0	0	0	0.1	0.2	0.1	0.7	0	12	0	12	0	12		
STOP		0	0	0.2	0.2	0.7	0.8	0	0	0.1	0.2	0	4.9	0.1	0	9.1	0.2	0.2	0.8	0	0	0	0.7	0.7	0.8	1.4	0	12	0	12	0	12	
PLAY		0	0	0.2	0.2	0.8	0.8	0	0	0.7	0	4.8	0.1	0	8.7	0.2	0.2	0.8	0	0	0	0.2	0.2	0.8	0.7	0	12	0	12	0	12		
FF		0	0	0.2	0.2	0.8	0.8	0	0	0.7	0	4.8	0.1	0	8.7	0.2	0.2	0.8	0	0	0	0.2	0.2	0.8	0.7	0	12	0	12	0	12		
REW		0	0	0.2	0.2	0.8	0.8	0	0	0.7	0	4.8	0.1	0	0	0.7	0.2	0.8	1.5	0	0	0.2	0.2	0.8	0.7	0	12	0	12	0	12		
REC		0	0	0.2	0.2	0.8	0.8	0	0	0.1	0.2	0	4.9	0	0	9.1	0.2	0.2	0.8	0.7	0	0	0.7	0.2	0.8	1.4	0	12	0	12	0	12	
TR. REF. NO.		Q611			Q612			Q613			Q614			Q615			Q616			Q617			Q618			Q619			Q620				
		E	C	B	E	C	B	E	C	B	E	C	B	E	C	B	E	C	B	E	C	B	E	C	B	E	C	B	E	C	B		
MODE		0	12	0	0	0	0	0	0	0	0	0	0	4.9	4.9	4.2	0	7.4	0	2.7	2.7	3.3	5.0	5.0	4.4	5.0	5.0	4.4	2.7	2.7	3.3		
STOP		0	12	0	0	0	0	0	0	0	0	0	0	4.9	4.9	4.2	0	7.4	0	2.7	2.7	3.2	4.9	4.9	4.9	4.9	4.9	4.3	2.7	2.7	3.2		
PLAY		0	12	0	0	0	0	0	0	0.7	0	0	0	0.7	4.9	0	4.9	0	0	0.7	2.7	2.7	3.2	4.9	4.9	4.9	4.9	4.9	4.3	2.7	2.7	3.2	
FF		0	12	0	0	0	0	0	0	6.6	0	0	9.5	0	4.9	0	4.9	0	0	0.7	2.7	2.7	3.2	4.9	4.9	4.9	4.9	4.9	4.3	2.7	2.7	3.2	
REW		0	12	0	0	0	0	0	0	6.6	0	0	9.5	0	4.9	0	4.9	0	4.9	0	0.7	2.7	2.7	3.2	4.9	4.9	4.9	4.9	4.9	4.3	2.7	2.7	3.2
REC		0	12	0	0	0	0	0	0	0.6	0	0	0.7	4.9	0	4.9	0	0	0.7	2.7	2.7	3.2	4.9	4.9	4.9	4.9	4.9	4.9	4.3	2.7	2.7	3.2	
TR. REF. NO.		Q621			Q622			Q623			Q624			Q625			Q626			Q627			Q628			Q629			Q630				
		E	C	B	E	C	B	E	C	B	E	C	B	E	C	B	E	C	B	E	C	B	E	C	B	E	C	B	E	C	B		
MODE		0	5.0	0	5.0	0	5.0	0	0	0.7	0	4.9	0	4.9	0	4.9	0	4.8	0	5.0	0	5.0	0	4.6	0.1	4.9	0.4	4.9	0	4.9	0		
STOP		0	5.0	0	5.0	0	5.0	0	0	0.7	0	4.9	0	4.9	0	4.9	0	4.8	0	5.0	0	5.0	0	4.6	0.1	4.9	0.4	4.9	0	4.9	0		
PLAY		0	0	0	4.9	4.9	4.3	0	4.9	0	0	4.9	0	4.9	0	4.9	0	4.8	0.1	4.9	0.2	4.9	0	4.7	0.1	4.9	0.3	4.9	0	4.9	0		
FF		0	0	0	4.9	4.9	4.3	0	0	0.7	0	4.9	0	4.9	0	4.9	0	4.8	0.1	4.9	0.2	4.9	0	4.6	0.1	4.9	0.4	4.9	0	4.9	0		
REW		0	0	0	4.9	4.9	4.3	0	0	0.7	0	4.9	0	4.9	0	4.9	0.1	4.9	0	4.8	0.1	4.9	0.2	4.9	0	4.7	0.1	4.9	0.3	4.9	0	4.9	
REC		0	0	0.5	4.9	4.9	4.3	0	4.9	0	0	4.9	0	4.9	0	4.9	0	4.9	0	4.9	0.1	4.9	0	4.9	0	4.8	0.1	4.9	0.2	4.9	0	4.9	
TR. REF. NO.		Q631			Q632			Q633			Q634			Q635			Q636			Q637			Q638			Q639			Q640				
		E	C	B	E	C	B	E	C	B	E	C	B	E	C	B	E	C	B	E	C	B	E	C	B	E	C	B	E	C	B		
MODE		0	0	0.6	0	0	0.6	4.9	0	4.9	4.9	0	4.9	4.9	0	4.9	4.9	0	4.9	4.9	0	4.9	4.9	0	4.9	4.9	0	4.9	0	0	0.2		
STOP		0	0	0.6	0	0	0.6	4.9	0	4.9	4.9	0	4.9	4.9	0	4.9	4.9	0	4.9	4.9	0	4.9	4.9	0	4.9	4.9	0	4.9	0	0	0.2		
PLAY		0	0	0.6	0	0	0.6	4.9	0	4.9	4.9	0	4.9	4.9	0	4.9	4.9	0	4.9	4.9	0	4.9	4.9	0	4.9	4.9	4.9	4.2	4.9	0	0.1	0.7	
FF		0	0	0.6	0	0	0.6	4.9	0	4.9	4.9	0	4.9	4.9	0	4.9	4.9	0	4.9	4.9	0	4.9	4.9	0	4.9	4.9	0	4.9	0	9.5	0.2		
REW		0	0	0.6	0	0	0.6	4.9	0	4.9	4.9	0	4.9	4.9	0	4.9	4.9	0	4.9	4.9	0	4.9	4.9	0	4.9	4.9	0	4.9	0	9.5	0.2		
REC		0	0	0.6	0	0	0.6	4.9	4.9	4.2	4.9	0	4.9	4.9	0	4.9	4.9	0	4.9	4.9	0	4.9	4.9	0	4.9	4.9	4.9	4.2	4.9	0	9.5	0.2	
TR. REF. NO.		Q641			Q642			Q643			Q644			Q645			Q646			Q647			Q648			Q649			Q650				
		E	C	B	E	C	B	E	C	B	E	C	B	E	C	B	E	C	B	E	C	B	E	C	B	E	C	B	E	C	B		
MODE		0	0	0	0	0	0	4.9	0	4.9	0.6	1.2	0.4	0.6	0.7	1.2	0.2	4.9	0.7	0	2.2	0.4	0	0	0	6.1	0	6.7	0	4.9	0		
STOP		0	0	0	0	0	0	4.9	0	4.9	0.6	1.2	0.4	0.6	0.7	1.2	0.2	4.9	0.7						0	6.1	0	6.7	0	4.9	0		
PLAY		0	9.5	0	0	9.5	0	4.9	0	4.9	0.6	1.2	0.4	0.6	0.7	1.2	0.2	4.9	0.7						0	6.1	0	6.7	0	4.9	0		
FF		0	9.5	0	0	9.5	0	4.9	0	4.9	0.6	1.2	0.4	0.6	0.7	1.2	0.2	4.9	0.7						0	6.1	0	6.7	0	4.9	0		
REW		0	9.5	0	0	9.5	0	4.9	0	4.9	0.6	1.2	0.4	0.6	0.7	1.2	0.2	4.9	0.7						0	6.1	0	6.7	0	4.9	0		
REC		0	9.5	0	0	0.1	0.7	4.9	0	4.9	0.6	1.2	0.4	0.6	0.7	1.2	0.2	4.9	0.7						0	6.1	0	6.7	0	4.9	0		
TR. REF. NO.		Q651			Q653			Q654			Q655			Q656			Q657			Q658													
		E	C	B				E	C	B	E	C	B	E	C	B	E	C	B	E	C	B											
MODE		0	0	0				0.2	11.9	0.7	0	0	0.2	0	0.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
STOP		0	0	0				0.2	11.9	0.7	0	0	0.2	0	0.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
PLAY		0	0	0.6				0.2	11.9	0.7	0	0	0.2	0	0.7	0	9.5	9.5	8.8	9.5	0	9.5	9.5	0.5	9.5								
FF		0	0	0.6				0.2	11.9	0.7	0	0	0.2	0	0.7	0	9.5	9.5	8.8	9.5	0	9.5	9.5	0.3	9.5								
REW		0	0	0.6				0.2	11.9	0.7	0	0	0.2	0	0.7	0	9.5	9.5	8.8	9.5	0	9.5	9.5	0.3	9.5								
REC		0	0	0.6				0.2	11.9	0.7	0	0	0.2	0	0.7	0	9.5	9.5	8.8	9.5	0	9.5	9.5	0.4	8.8								



P601 (System Control C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	Pressure SOL (L)	P6312-3 (Pressure Solenoid)
2	Pressure SOL REL (H)	P6312-1 (Pressure Solenoid)

P602 (System Control C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	Supply Photo TR	Supply Photo TR Connection
2	Takeup Photo TR	Takeup Photo TR Connection

P603 (System Control C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	GND	P6301-1 (Reel Sensor)
2	Takeup Detector	P6301-2 (Reel Sensor)
3	All Mode +9.5V	P6301-3 (Reel Sensor)

P604 (System Control C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	C1 Port	J4 (Key Board)
2	C0 Port	J3 (Key Board)
3	C2 Port	J6 (Key Board)
4	B2 Port	J1 (Key Board)
5	B0 Port	J2 (Key Board)
6	B1 Port	J5 (Key Board)
7	B3 Port	J7 (Key Board)

P605 (System Control C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	Bφ Port	P6302-2 (Loading/Unloading Completion Switch)
2	Unloading COMP	P6302-1 (Loading/Unloading Completion Switch)
3	Loading COMP	P6302-3 (Loading/Unloading Completion Switch)

P606 (System Control C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	Stop LED	J16 (Key Board)
2	REC LED	J9 (Key Board)
3	Audio DUB LED	J12 (Key Board)
4	Pause LED	J10 (Key Board)
5	REW LED	J11 (Key Board)
6	P.B. LED	J15 (Key Board)
7	GND	J8 (Key Board)
8	DEW LED	J17 (Key Board)
9	EJT LED	J14 (Key Board)
10	FF LED	J13 (Key Board)

P607 (System Control C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	Unreg +9.5V	P34-7 (Video Process)
2	Muting	P34-8 (Video Process)
3	REC +9.5V	P34-4 (Video Process)
4	Audio DUB +9.5V	P34-3 (Video Process)
5	Loading Comp. (L)	P34-6 (Video Process)
6	P.B. +9.5V	P34-5 (Video Process)
7	60 Hz	P34-1 (Video Process)
8	GND	P34-2 (Video Process)

P608 (System Control C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	Loading Motor (L)	FF Micro Switch
2	Loading Motor (H)	FF Micro Switch

P609 (System Control C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	AVR Drive	P1103-2 (AVR)
2	UNREG +12V	P1103-5 (AVR)
3	Camera Pause	P6308-4 (Input Selector)
4	Under Cut	P1103-3 (AVR)
5	Timer ON	P6304-3 (18P Connector)
6	Timer Set	P6304-4 (18P Connector)
7	GND	P1103-1 (AVR)
8	+9.5V	P1103-4 (AVR)

P611 (System Control C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	Cylinder Motor ON	P205-3 (Servo)
2	GND	P205-1 (Servo)
3	Cylinder Protection	P205-5 (Servo)
4	Capstan Motor ON	P205-4 (Servo)
5	Pause (H)	P205-2 (Servo)

P612 (System Control C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	REW SOL (L)	REW SOL (SL6303)
2	REW SOL (H)	REW SOL (SL6303)

P613 (System Control C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	FF SOL (L)	FF SOL. (SL6302)
2	FF SOL (H)	FF SOL. (SL6302)
3	SOL. COM.	FF SOL. (SL6302)

P614 (System Control C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	EJT SOL (H)	EJT SOL. (SL6304)
2	EJT SOL (L)	EJT SOL. (SL6304)

P615 (System Control C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	GND	DEW SENSOR
2	DEW SENSOR	DEW SENSOR

P616 (System Control C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	+9.5V(SOL)	P6312-2 (Pressure Solenoid)
2	+5V	Safety TAB SW (SW6348)
3	Carriage Down SW	Carriage Down SW (SW6343)
4	Safety TAB SW	Safety TAB SW (SW6348)

SYSTEM CONTROL C.B.A (VEPS0601 A1)

P609	
1	AVR DRIVE
2	
3	UNREG +12V
4	CAMERA PAUSE
5	UNDER CUT
6	TIMER ON
7	TIMER SET
8	G N D
9	+9.5V

P611	
1	CYLINDER MOTER ON
2	G N D
3	CYLINDER PROTECTION
4	CAPSTAN MOTER ON
5	PAUSE (H)

P608	
1	LOADING MOTOR (L)
2	LOADING MOTOR (H)

P615	
1	G N D
2	DEW SENSOR

P616	
1	+9.5V(SOL)
2	+5V
3	CARRIAGE DOWN SW
4	SAFETY TAB SW

P607	
1	UNREG +9.5V
2	MUTING
3	REC +9.5V
4	AUDIO DUB +9.5V
5	LOADING COMPLETION (L)
6	PR +9.5V
7	60Hz
8	G N D

P606	
1	STOP LED
2	REC LED
3	AUDIO DUB LED
4	PAUSE LED
5	REW LED
6	RB LED
7	G N D
8	DEW LED
9	EJT LED
10	FF LED

P605	
1	B PORT
2	UNLOADING COMPLETION
3	LOADING COMPLETION

P601	
1	PRESSURE SOLENOID (L)
2	PRE, SOLENOID, RELEASE (H)

P612	
1	REW SOLENOID (L)
2	REW SOLENOID (H)

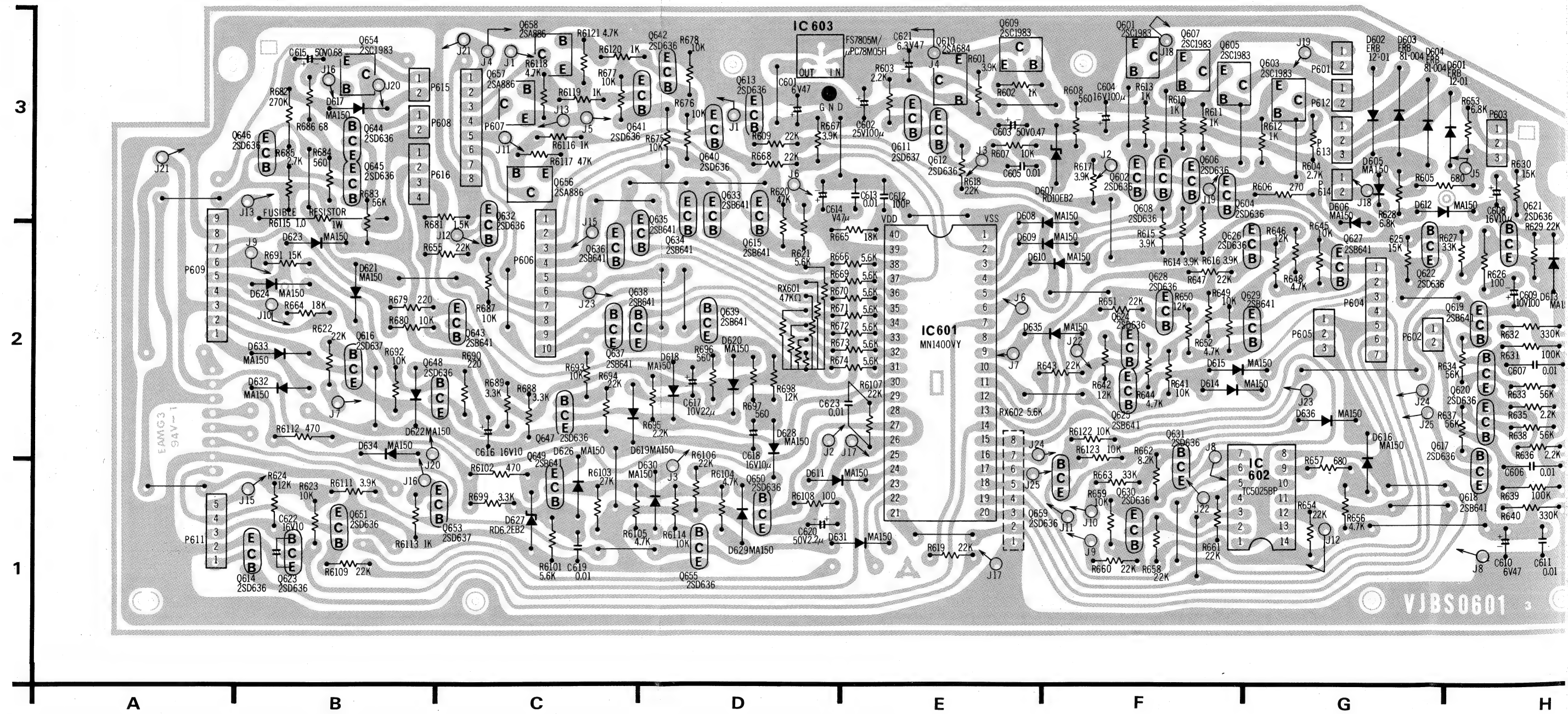
P613	
1	FF SOLENOID (L)
2	FF SOLENOID (H)
3	SOLENOID COMPLETION

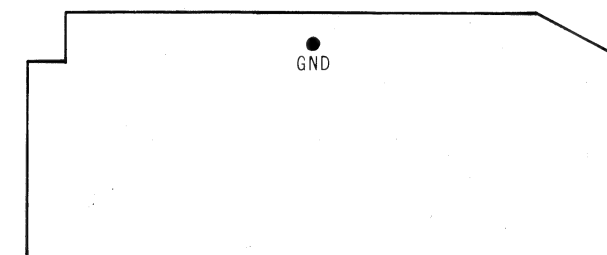
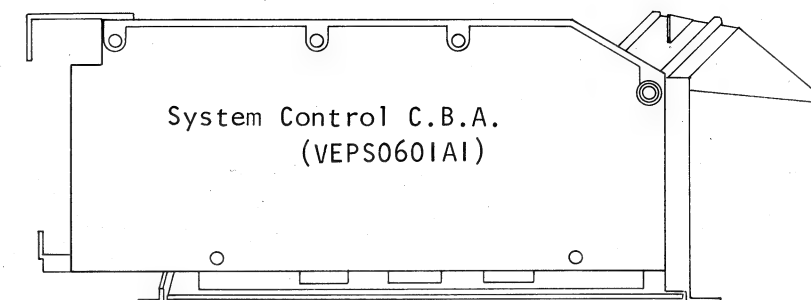
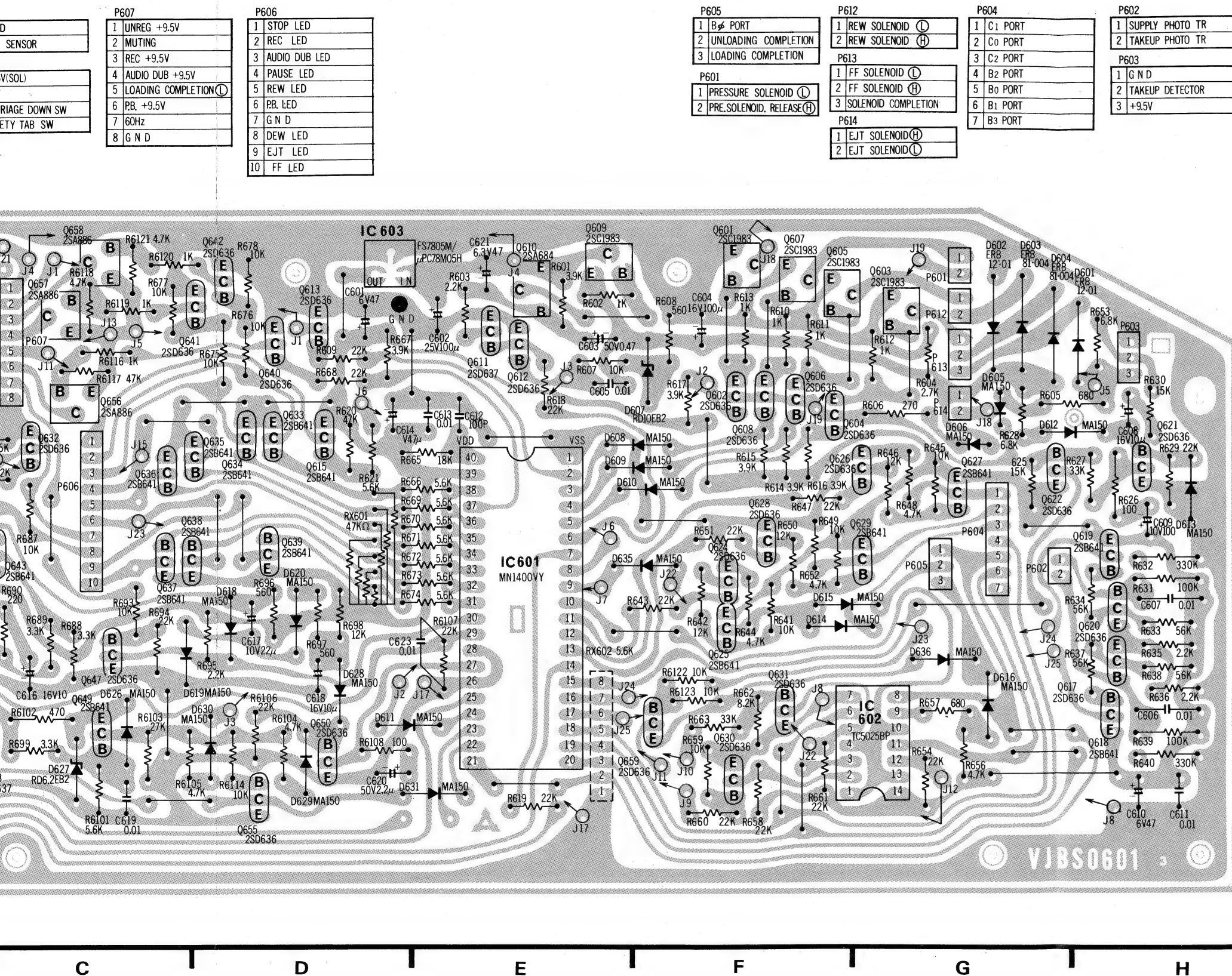
P614	
1	EJT SOLENOID (H)
2	EJT SOLENOID (L)

P604	
1	C1 PORT
2	C0 PORT
3	C2 PORT
4	B2 PORT
5	B0 PORT
6	B1 PORT
7	B3 PORT

P602	
1	SUPPLY PHOTO TF
2	TAKEUP PHOTO TF

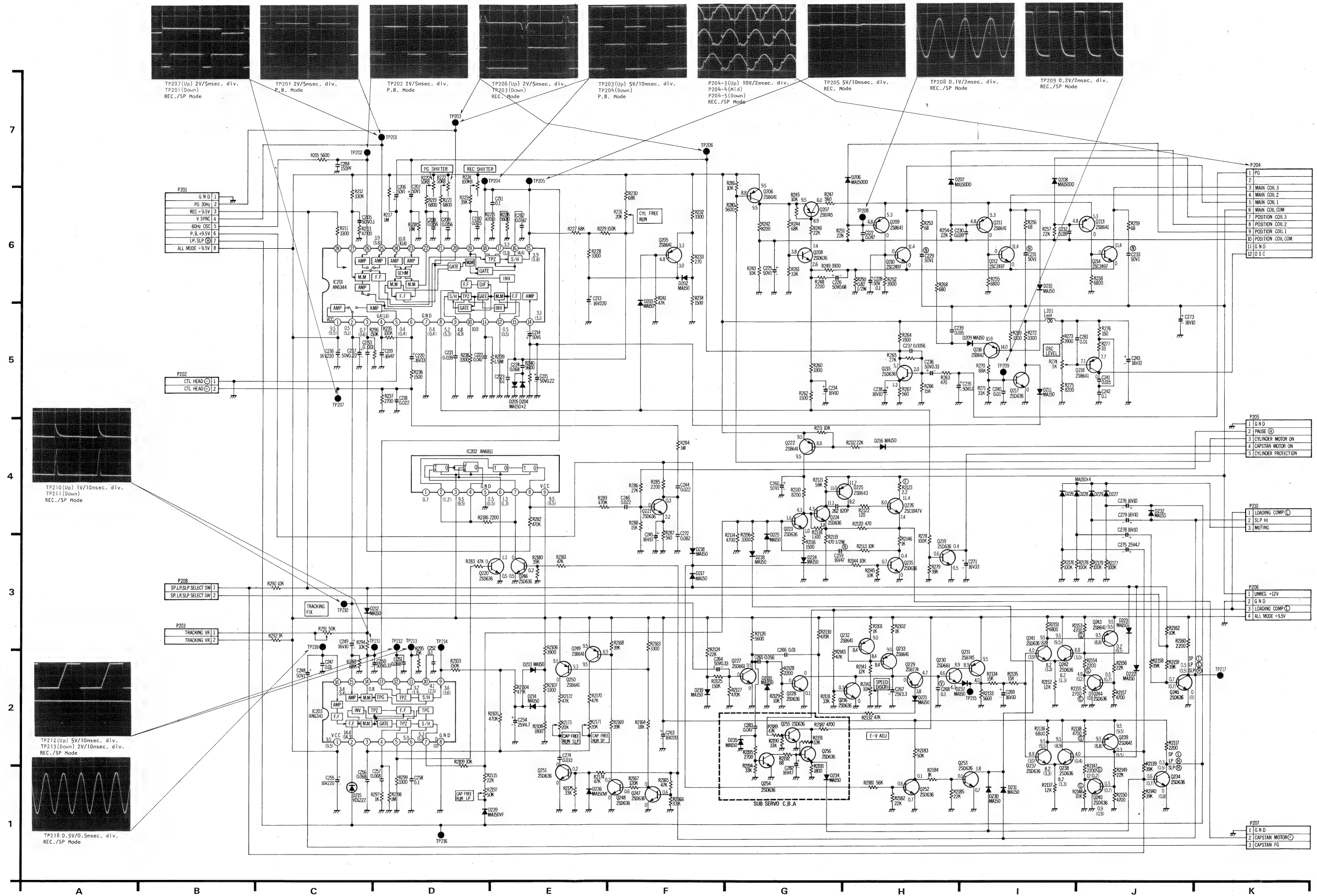
P603	
1	G N D
2	TAKEUP DETECTOR
3	+9.5V



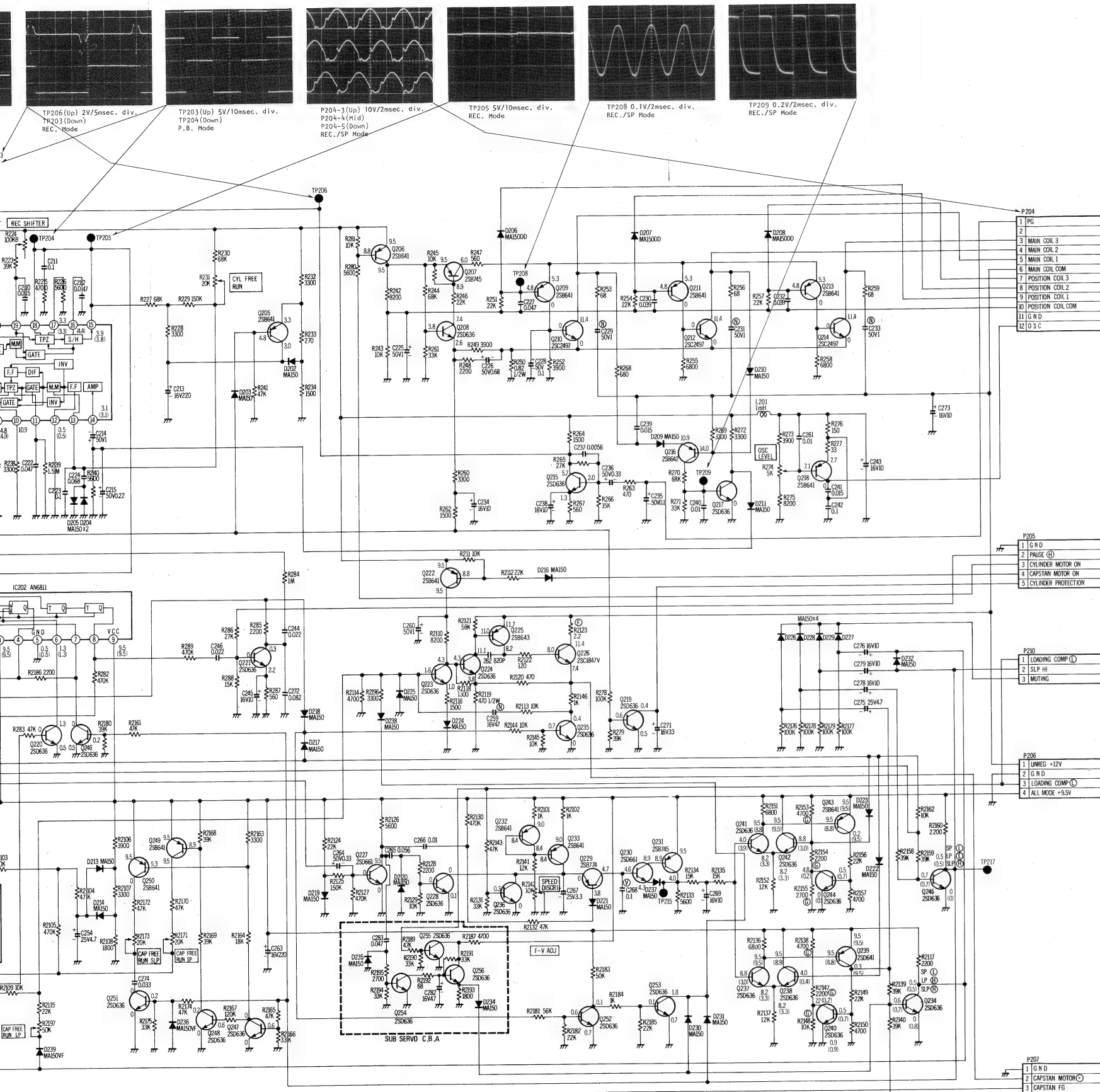


SYSTEM CONTROL CIRCUIT							
Q601	F-3	Q616	B-2	Q633	D-2	Q650	D-1
Q602	F-3	Q617	H-2	Q634	D-2	Q651	B-1
Q603	G-3	Q618	H-1	Q635	C-2	Q653	B-1
Q604	F-3	Q619	H-2	Q636	C-2	Q654	B-3
Q605	F-3	Q620	H-2	Q637	C-2	Q655	D-1
Q606	F-3	Q621	H-2	Q638	C-2	Q656	C-3
Q607	F-3	Q622	G-2	Q639	D-2	Q657	C-3
Q608	F-3	Q623	B-1	Q640	D-3	Q658	C-3
Q609	E-3	Q624	F-2	Q641	C-3	Q659	F-1
Q610	E-3	Q625	F-2	Q642	D-3		
Q611	E-3	Q626	G-2	Q643	C-2		
Q612	E-3	Q627	G-2	Q644	B-3		
Q613	D-3	Q628	F-2	Q645	B-3		
Q614	B-1	Q629	G-2	Q646	B-3		
Q615	D-2	Q630	F-1	Q647	C-2		
		Q631	F-1	Q648	B-2		
		Q632	C-2	Q649	C-1		

SERVO/SUB SERVO SCHEMATIC DIAGRAM



MATIC DIAGRAM



P201 (Servo C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	GND	P32-3 (Video Process)
2	PG 30Hz	P32-2 (Video Process)
3	REC +9.5V	P32-5 (Video Process)
4	V SYNC	P32-10 (Video Process)
5	60 Hz OSC	P32-1 (Video Process)
6	P.B. +9.5V	P32-6 (Video Process)
7	LP, SLP (H)	P32-4 (Video Process)
8	All Mode +9.5V	P32-7 (Video Process)

P202 (Servo C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	CTL Head ⊖	Audio Head Connection (H6303-C)
2	CTL Head ⊕	Audio Head Connection (H6303-C)

P203 (Servo C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	Tracking VR	P6311-1 (Input Selector)
2	Tracking VR	P6311-2 (Input Selector)

P204 (Servo C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	PG	Cylinder Motor
2	-	-
3	Main Coil 3	Cylinder Motor
4	Main Coil 2	Cylinder Motor
5	Main Coil 1	Cylinder Motor
6	Main Coil COM	Cylinder Motor
7	Position Coil 3	Cylinder Motor
8	Position Coil 2	Cylinder Motor
9	Position Coil 1	Cylinder Motor
10	Position Coil COM	Cylinder Motor
11	GND	Cylinder Motor
12	OSC	Cylinder Motor

P205 (Servo C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	GND	P611-2 (System Control)
2	Pause (H)	P611-5 (System Control)
3	Cylinder Motor ON	P611-1 (System Control)
4	Capstan Motor ON	P611-4 (System Control)
5	Cylinder Protection	P611-3 (System Control)

P206 (Servo C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	Unreg +12V	P1102-1 (AVR C.B.A.)
2	GND	P1102-3 (AVR C.B.A.)
3	Loading Comp (L)	P1102-4 (AVR C.B.A.)
4	All Mode +9.5V	P1102-2 (AVR C.B.A.)

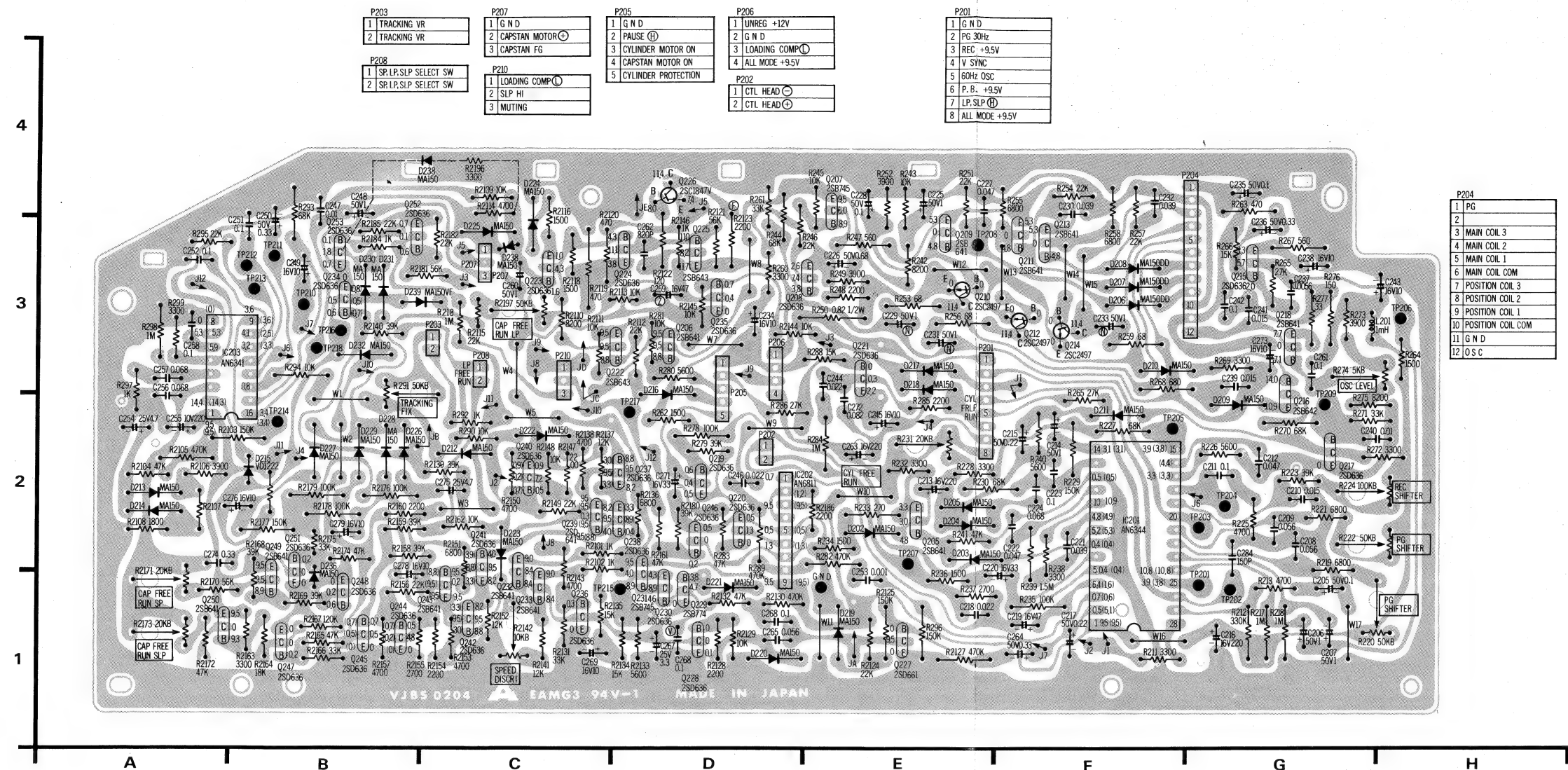
P207 (Servo C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	GND	Capstan Motor (M6302)
2	Capstan Motor ⊕	Capstan Motor (M6302)
3	Capstan FG	Capstan FG Head (H6308)

P208 (Servo C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	SP,LP,SLP Select SW	J5 (Switch Control)
2	SP,LP,SLP Select SW	J8 (Switch Control)

P210 (Servo C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	Loading Comp (L)	P36-5 (Video Process)
2	SLP (H)	P32-8 (Video Process)
3	Muting	P32-9 (Video Process)

SERVO C.B.A (VEPS0204A1)

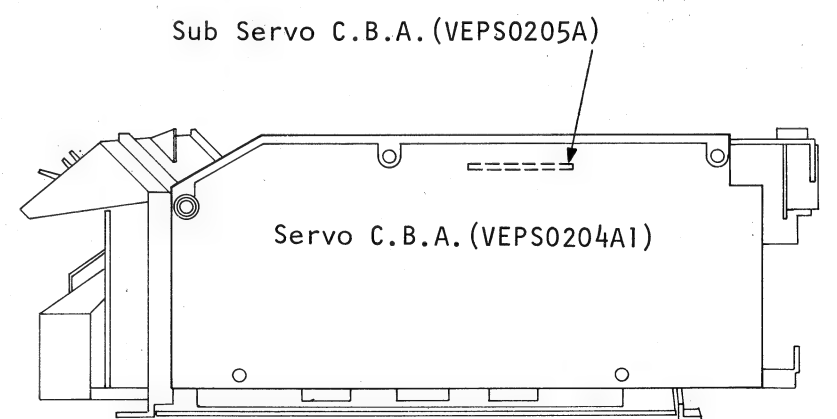
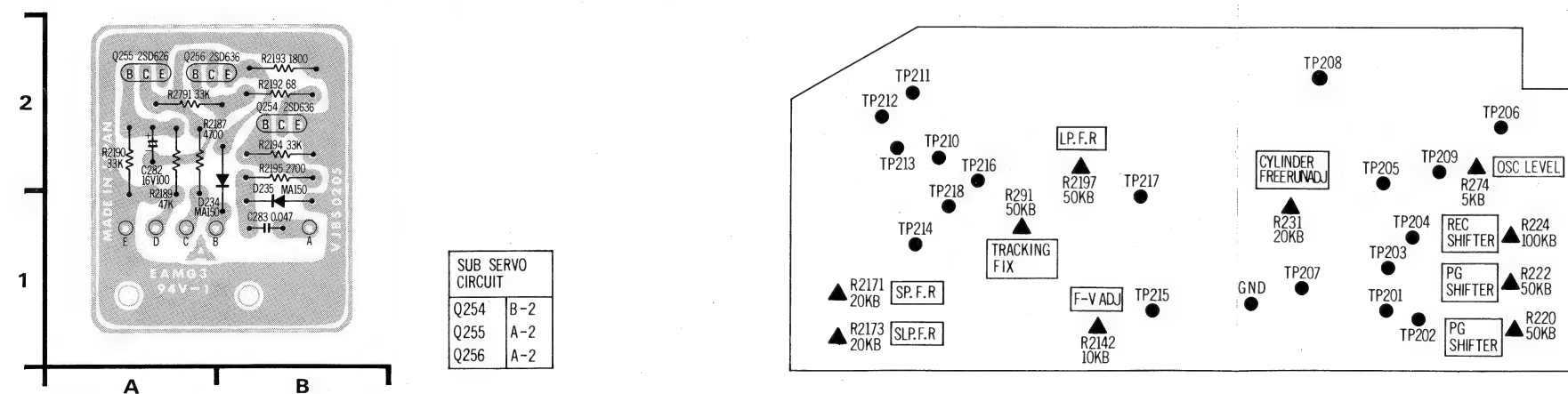
3-33
SERVO C.B.A
SUB SERVO C.B.A



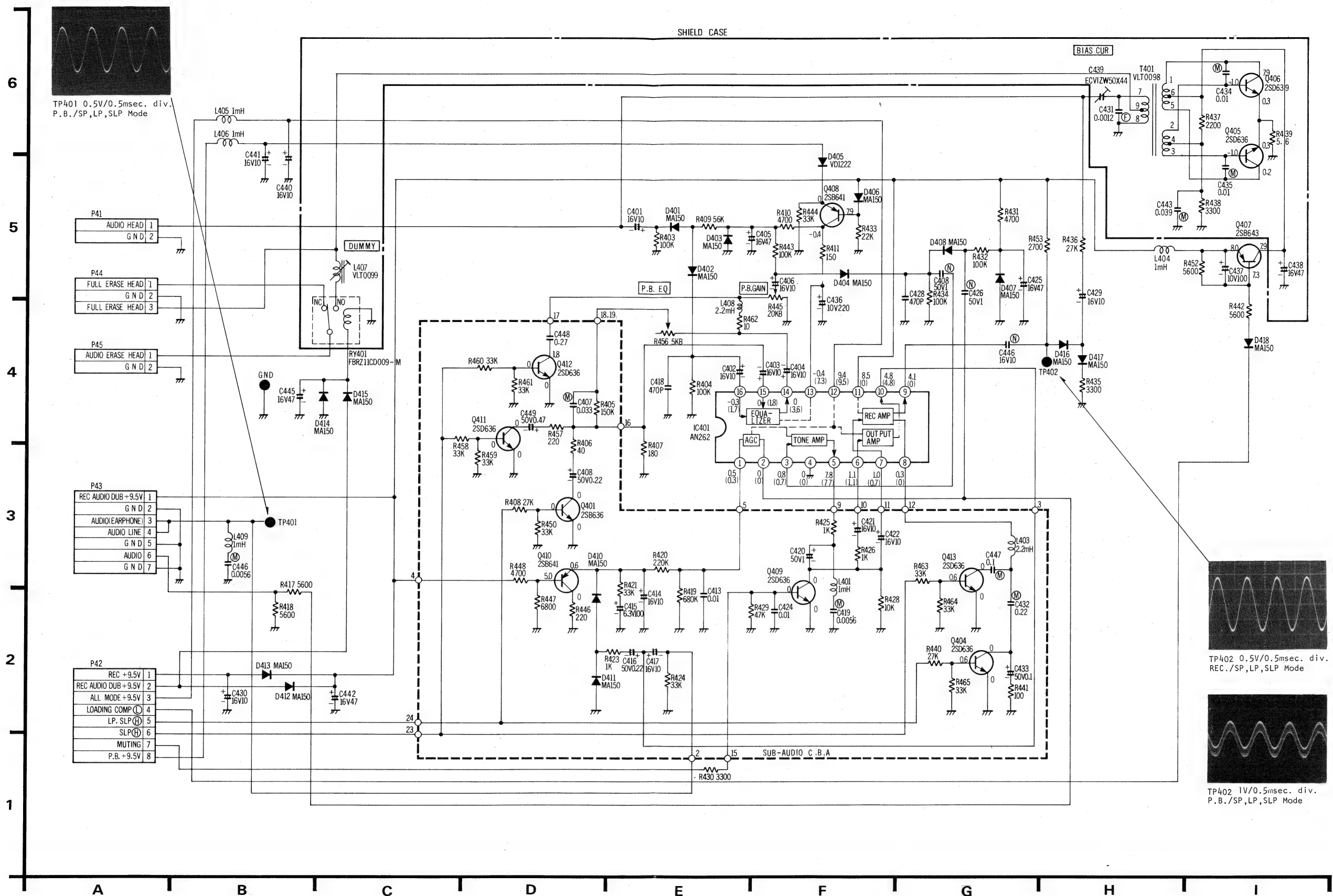
SERVO CIRCUIT		
Q205	E-2	Q237 D-2
Q206	D-3	Q238 D-2
Q207	E-4	Q239 C-2
Q208	E-3	Q240 C-2
Q209	E-3	Q241 C-1
Q210	E-3	Q242 C-1
Q211	F-3	Q243 C-1
Q212	F-3	Q244 B-1
Q213	F-3	Q245 B-1
Q214	F-3	Q246 D-2
Q215	G-3	Q247 B-1
Q216	G-3	Q248 B-1
Q217	G-2	Q249 B-1
Q218	G-3	Q250 A-1
Q219	D-2	Q251 B-1
		Q252 B-3
		Q253 B-3

Q220	D-2
Q221	E-3
Q222	D-3
Q223	C-3
Q224	D-3
Q225	D-3
Q226	D-4
Q227	E-1
Q228	D-1
Q229	D-1
Q230	D-1
Q231	D-1
Q232	C-1
Q233	C-1
Q234	B-3
Q235	D-3
Q236	C-1

SUB SERVO C.B.A (VEPS0205A)



AUDIO/SUB AUDIO SCHEMATIC DIAGRAM



AUDIO C.B.A (VEPS0402 A1)

P42	
1	REC +9.5V
2	REC AUDIO DUB +9.5V
3	ALL MODE +9.5V
4	LOADING COMP (L)
5	LP,SLP (H)
6	SLP (H)
7	MUTING
8	P. B. +9.5V

P41	
1	AUDIO HEAD
2	G N D

P43	
1	REC AUDIO DUB +9.5V
2	G N D
3	AUDIO (EARPHONE)
4	AUDIO LINE
5	G N D
6	AUDIO
7	G N D

P44	
1	FULL ERASE HEAD
2	G N D
3	FULL ERASE HEAD

P45	
1	AUDIO ERASE HEAD
2	G N D

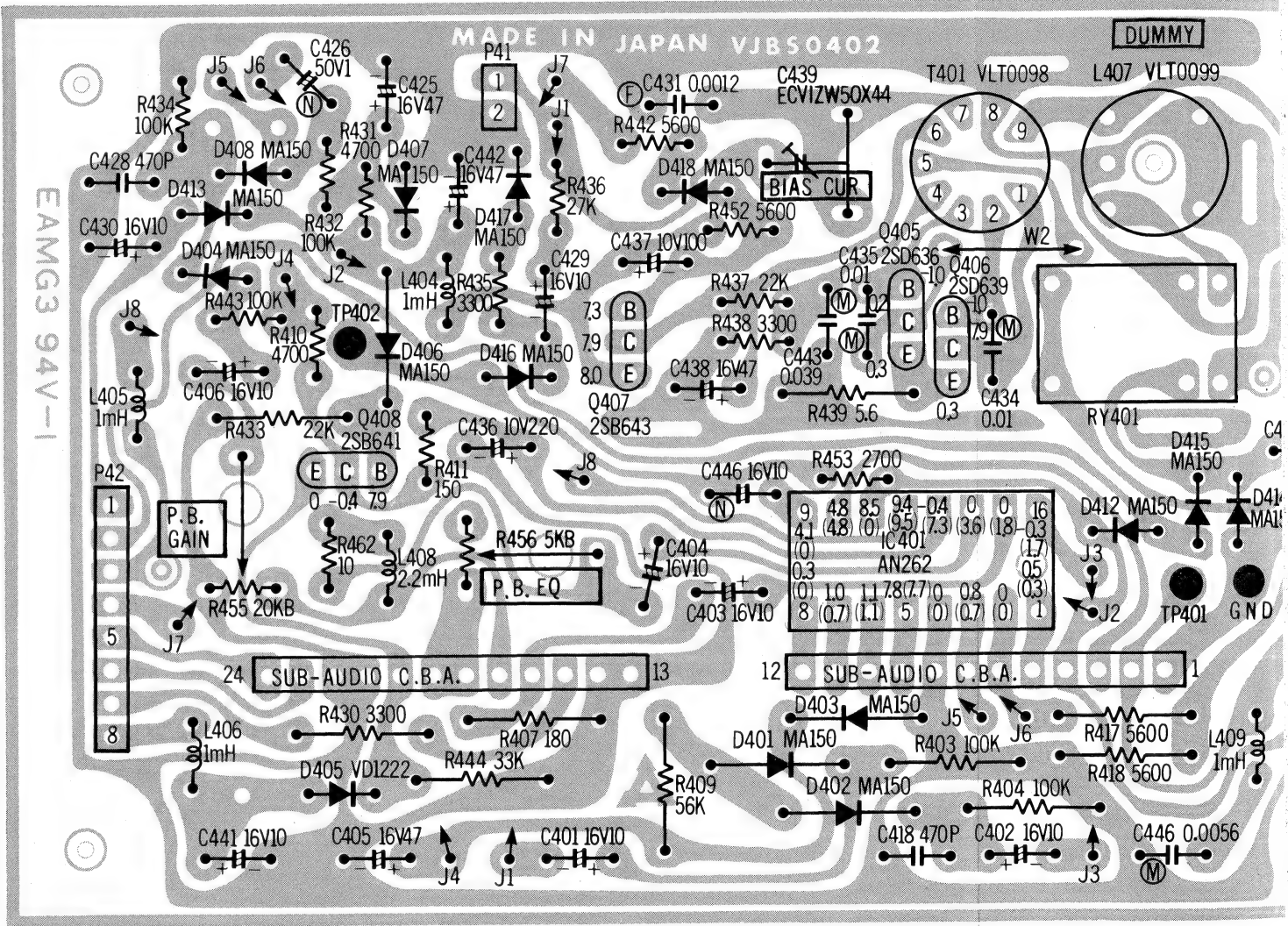
P41 (Audio C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	Audio Head	Audio Head Connection (H6303-A)
2	GND	

P42 (Audio C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	REC +9.5V	P36-2 (Video Process)
2	REC Audio DUB +9.5V	P36-1 (Video Process)
3	All Mode +9.5V	P36-6 (Video Process)
4	Loading Comp (L)	P36-4 (Video Process)
5	LP,SLP (H)	P36-7 (Video Process)
6	SLP (H)	P36-8 (Video Process)
7	Muting	P36-9 (Video Process)
8	P.B.+9.5V	P36-3 (Video Process)

P43 (Audio C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	REC Audio DUB +9.5V	P6310-5 (Input Selector)
2	GND	P6310-1 (Input Selector)
3	Audio(Earphone)	P6310-2 (Input Selector)
4	Audio(Line)	P6305-10 (18P Connector)
5	GND	P6305-9 (18P Connector)
6	Audio	P6310-4 (Input Selector)
7	GND	P6310-3 (Input Selector)

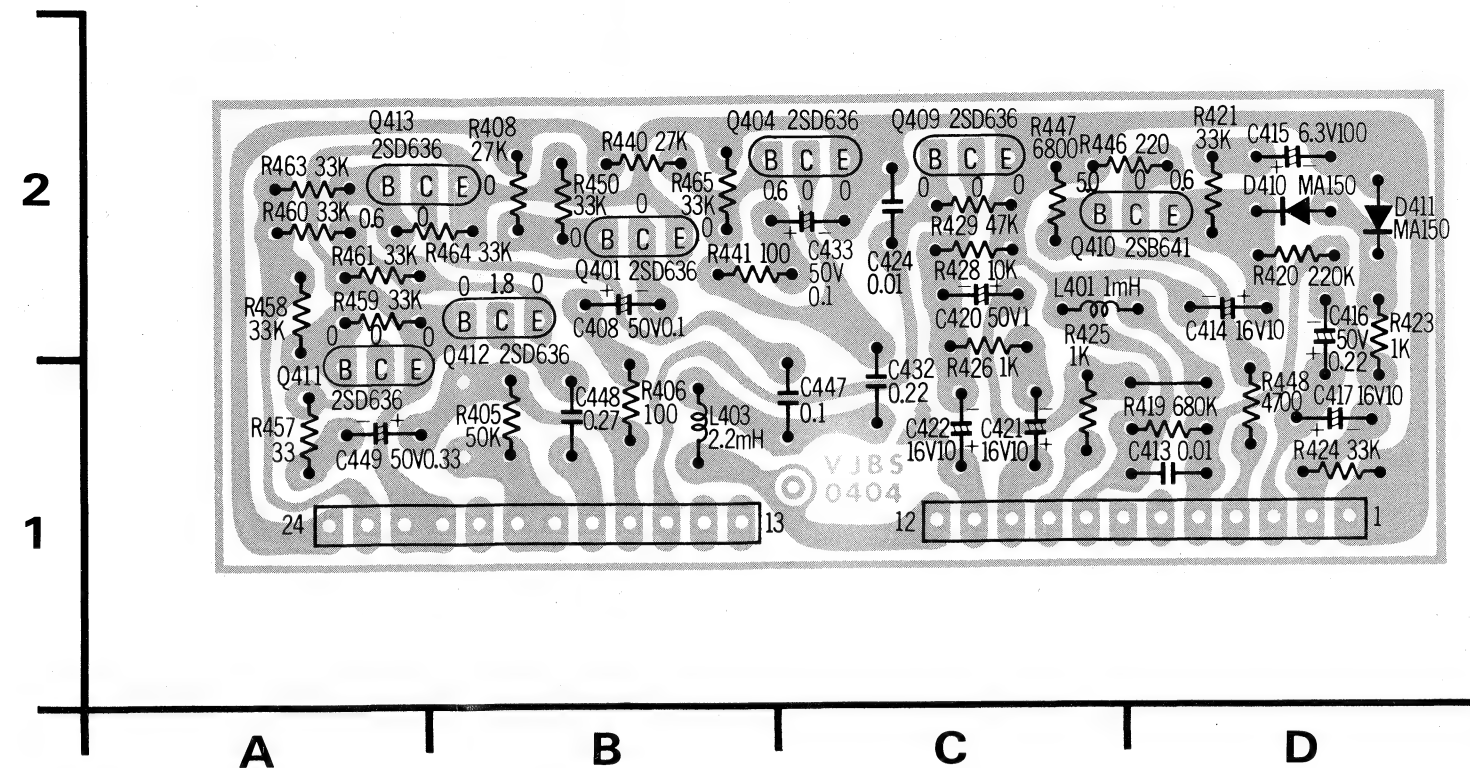
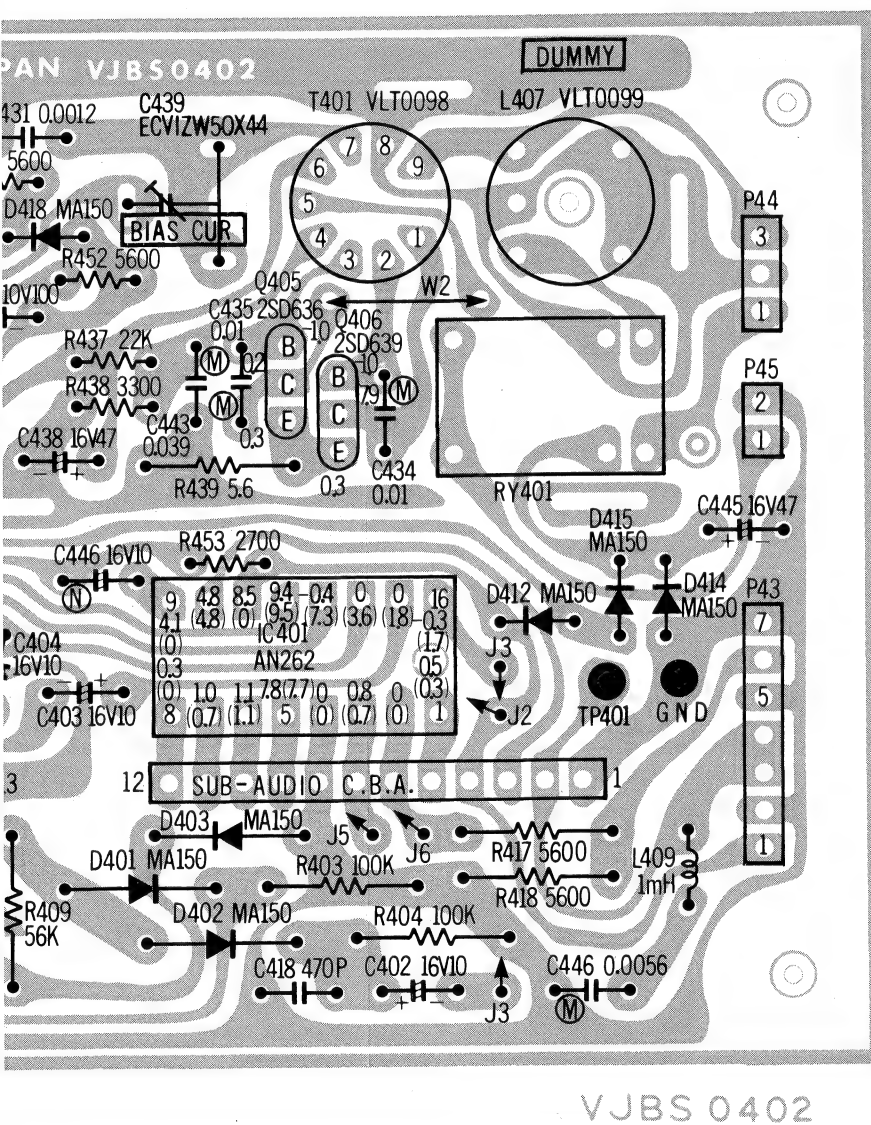
P44 (Audio C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	Full Erase Head	F.E. Head (H6304)
2	GND	F.E. Head (H6304)
3	Full Erase Head	F.E. Head (H6304)

P45 (Audio C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	Audio Erase Head	Audio Head Connection (H6303-B)
2	GND	Audio Head Connection (H6303-B)

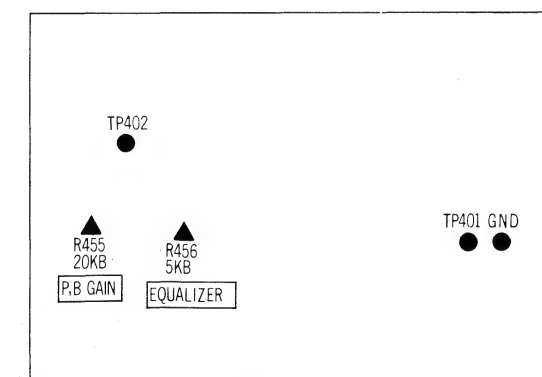
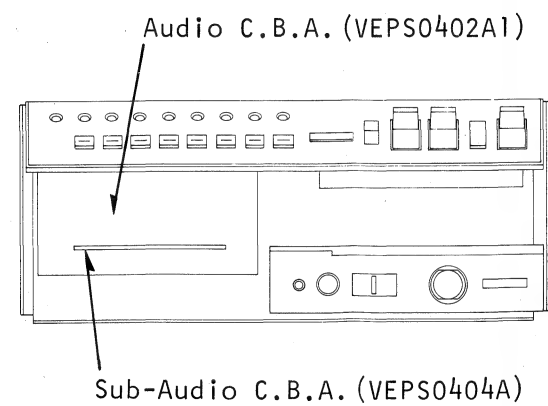


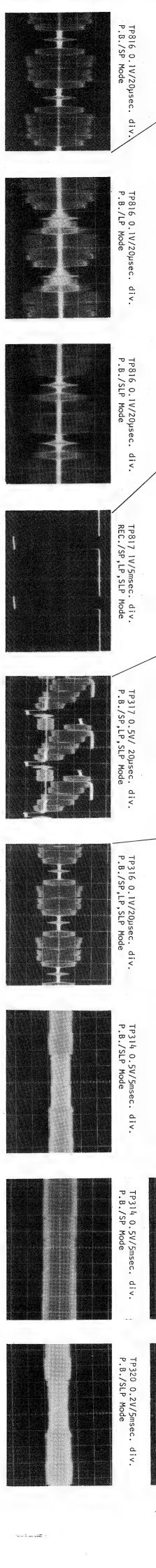
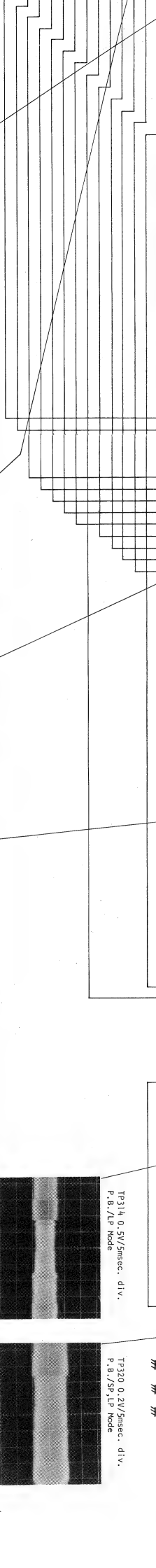
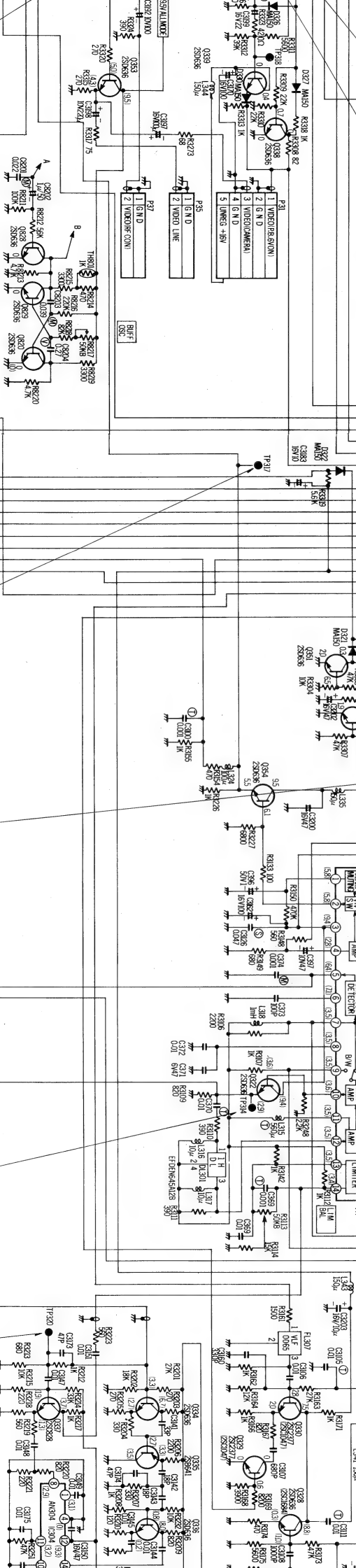
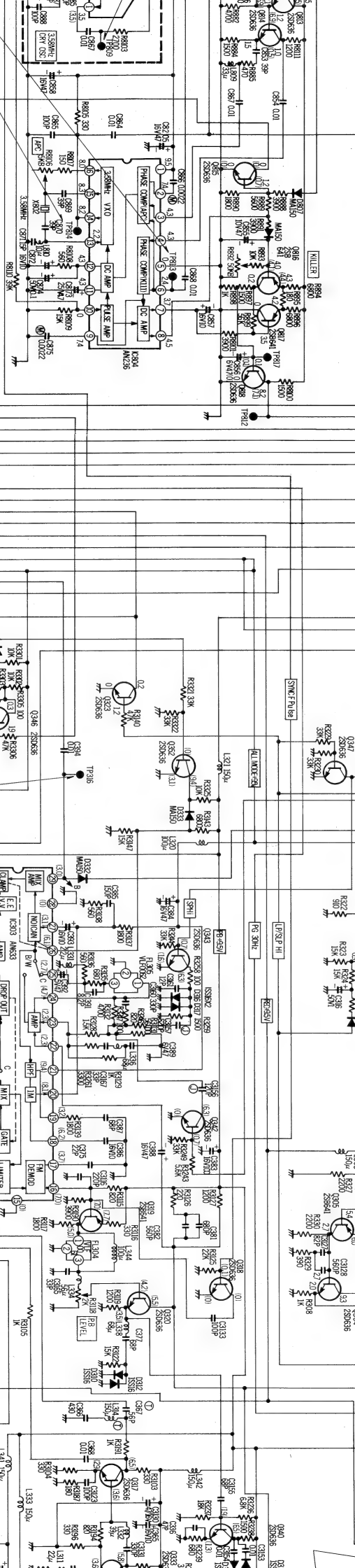
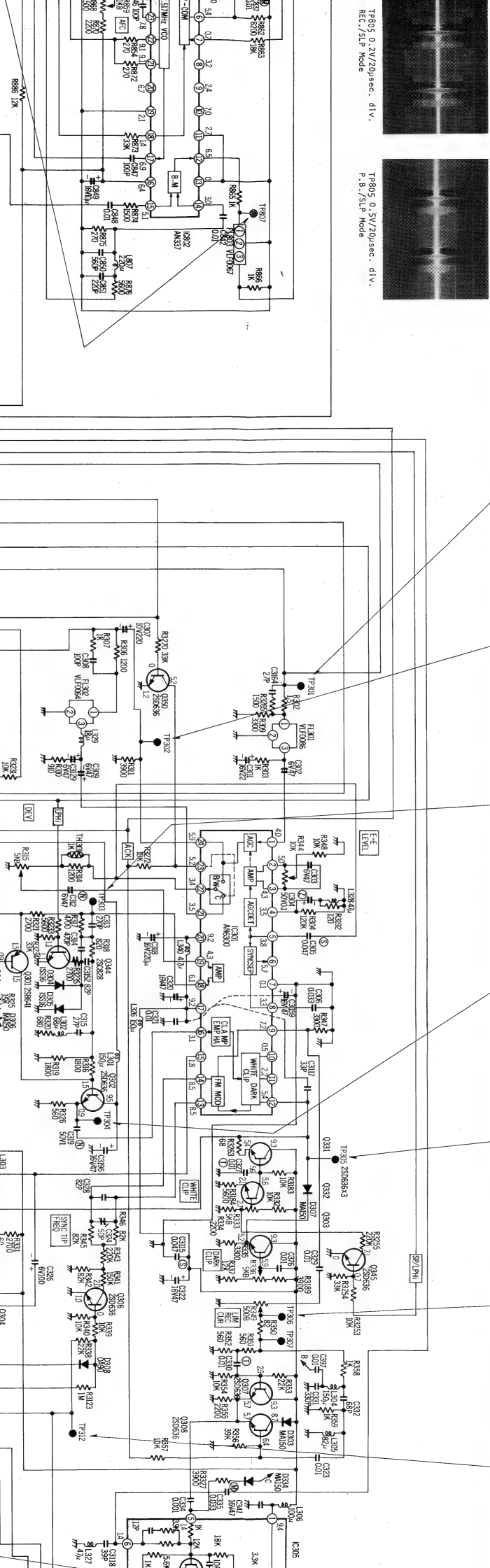
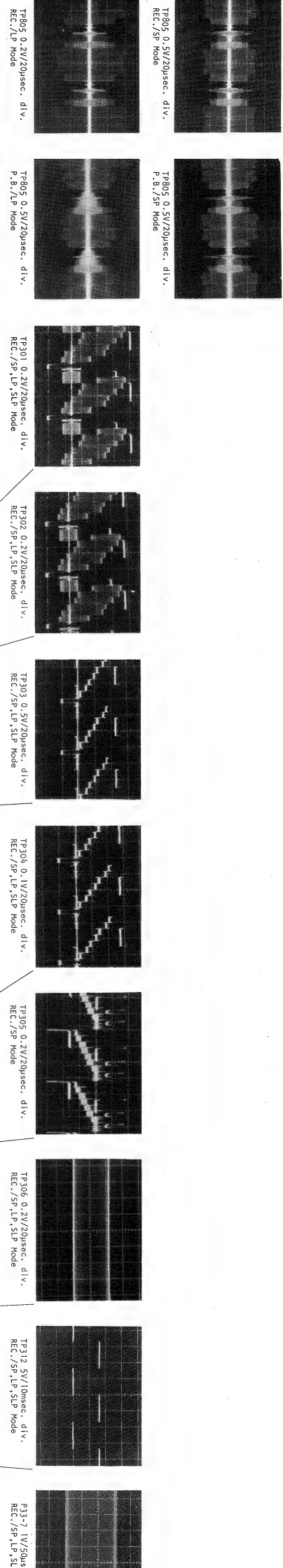
3-35
AUDIO C.B.A
SUB AUDIO C.B.A

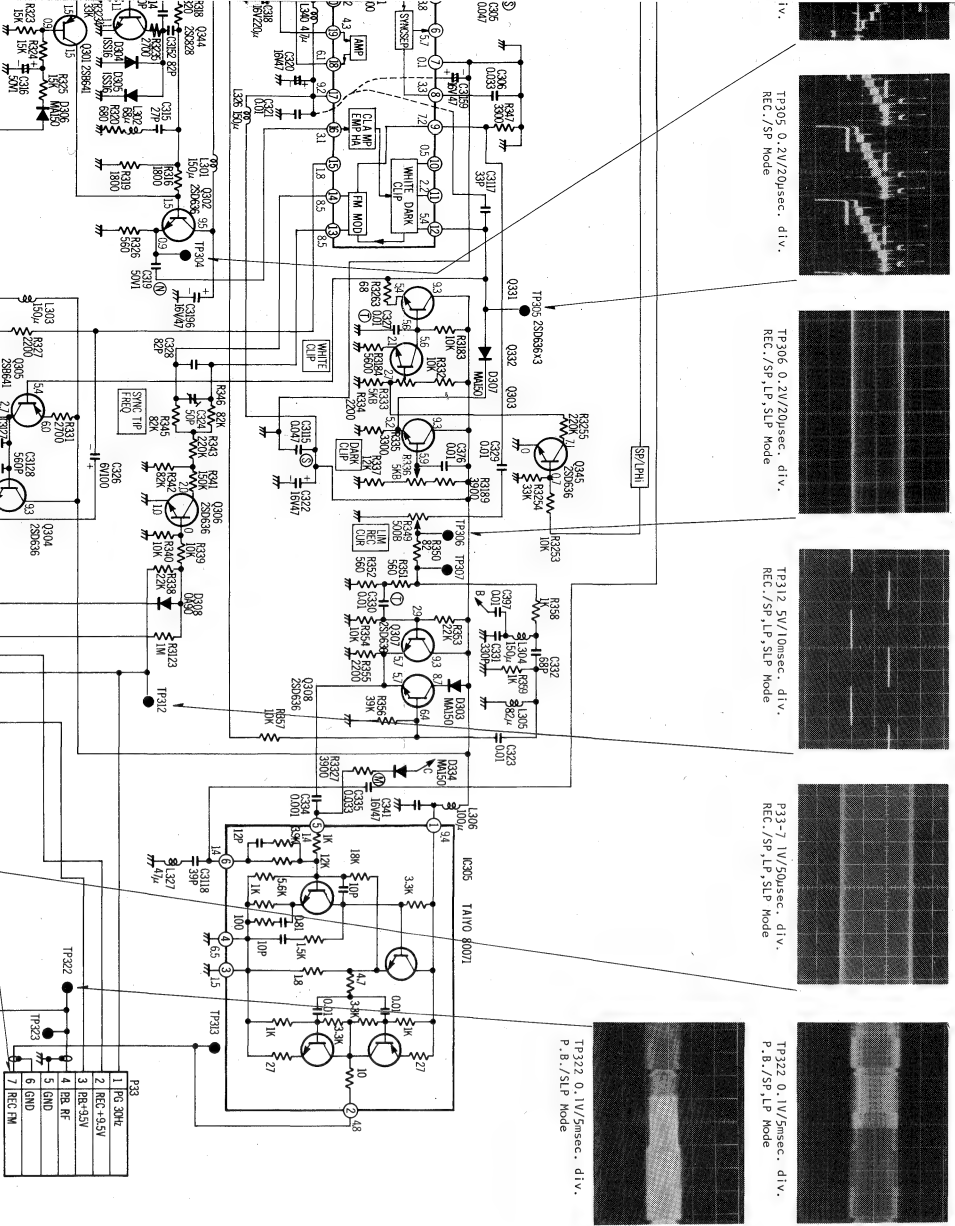
P43		P44		AUDIO CIRCUIT	
1	REC AUDIO DUB +9.5V	1	FULL ERASE HEAD	Q405	C-2
2	G N D	2	G N D	Q406	C-2
3	AUDIO (EARPHONE)	3	FULL ERASE HEAD	Q407	B-2
4	AUDIO LINE	P45		Q408	B-2
5	G N D	1	AUDIO ERASE HEAD		
6	AUDIO	2	G N D		
7	G N D				



SUB AUDIO CIRCUIT	
Q401	B-2
Q404	C-2
Q409	C-2
Q410	D-2
Q411	A-1
Q412	B-2
Q413	A-2







P31 (Video Process C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	Video (PB, 6V ON)	P6308-8 (Input Selector)
2	GND	P6308-9 (Input Selector)
3	Video (Camera)	P6308-6 (Input Selector)
4	GND	P6308-7 (Input Selector)
5	UNREG +16V	P6308-1 (Input Selector)

P32 (Video Process C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	60 Hz OSC	P201-5 (Servo)
2	P6 30Hz	P201-2 (Servo)
3	GND	P201-1 (Servo)
4	LP, SLP (Ⓢ)	P201-7 (Servo)
5	REC +9.5V	P201-6 (Servo)
6	P.B. +9.5V	P201-8 (Servo)
7	ALL Mode +9.5V	P210-2 (Servo)
8	SLP (Ⓢ)	P210-3 (Servo)
9	V SYNC	P210-4 (Servo)
10		

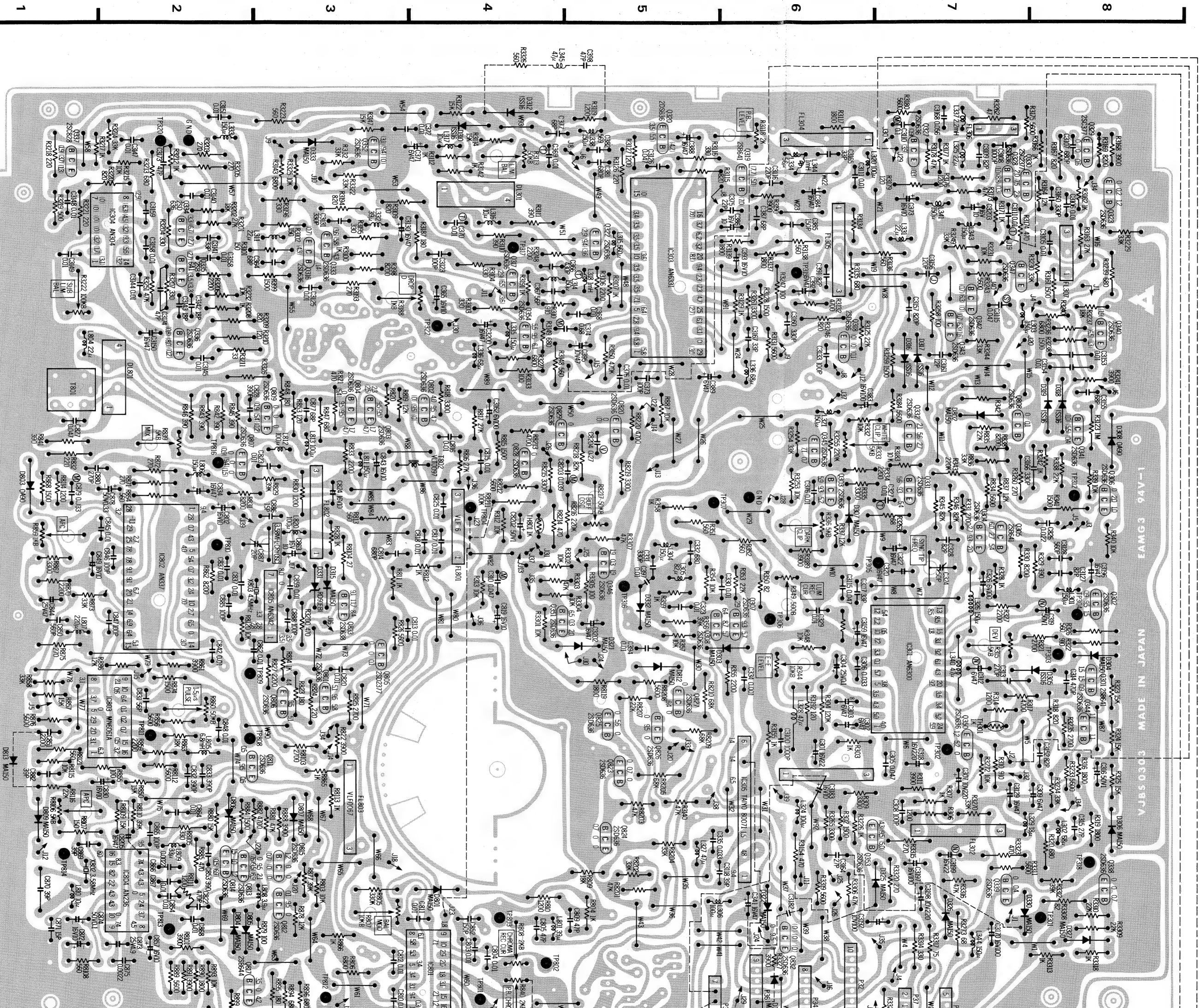
P33 (Video Process C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	P6 30 Hz	P56-4 (Head Amp.-)
2	REC +9.5V	P56-7 (Head Amp.-)
3	P.B. +9.5V	P56-1 (Head Amp.-)
4	P.B. RF	P56-5 (Head Amp.-)
5	GND	P56-6 (Head Amp.-)
6	GND	P56-3 (Head Amp.-)
7	REC FM	P56-2 (Head Amp.-)

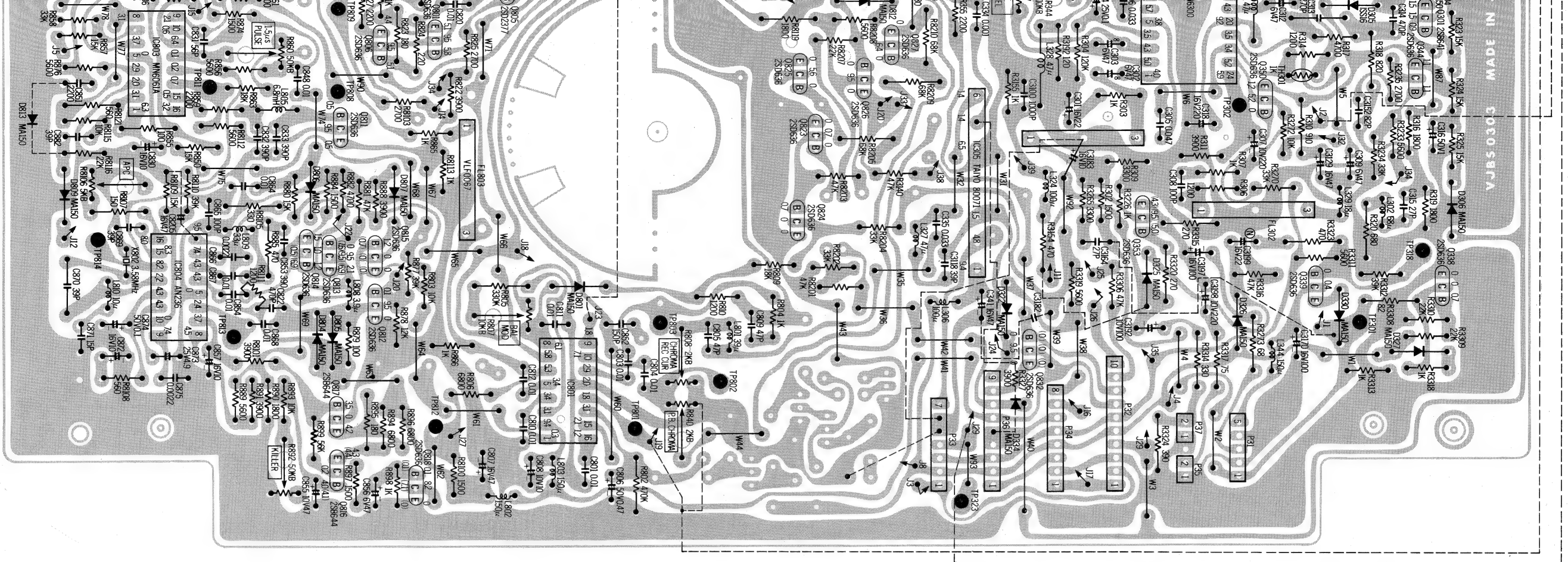
P34 (Video Process C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	60 Hz	P607-7 (System Control)
2	GND	P607-8 (System Control)
3	Audio DUB +9.5V	P607-4 (System Control)
4	REC +9.5V	P607-3 (System Control)
5	P.B. +9.5V	P607-6 (System Control)
6	Loading Comp (Ⓢ)	P607-5 (System Control)
7	UNREG +9.5V	P607-1 (System Control)
8	Muting	P607-2 (System Control)

P35 (Video Process C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	GND	P6305-5 (18P Connector)
2	Video(Line)	P6305-6 (18P Connector)

P36 (Video Process C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	REC Audio DUB +9.5V	P42-2 (Audio)
2	REC +9.5V	P42-1 (Audio)
3	P.B. +9.5V	P42-8 (Audio)
4	Loading COMP (Ⓢ)	P42-4 (Audio)
5	P210-1 (Servo)	P42-3 (Audio)
6	ALL MODE +9.5V	P42-5 (Audio)
7	LP, SLP (Ⓢ)	P42-6 (Audio)
8	SLP (Ⓢ)	P42-7 (Audio)
9	Muting	

P37 (Video Process C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	GND	RF Converter
2	Video (RF CON.)	RF Converter





P31

1	VIDEO(FAVON)
2	G.N.D
3	VIDEO(CAMERA)
4	G.N.D
5	LUMERG +BV

P37

1	G.N.D
2	VIDEO(R CON)

P5

1	G.N.D
2	VIDEO LME

P32

1	60Hz OSC
2	PG 30Hz
3	G.N.D
4	LP SP (D)
5	REC +9.5V
6	PR +9.5V
7	ALL MODE +9.5V
8	SIP (D)
9	MULTING
10	V SYNC

P34

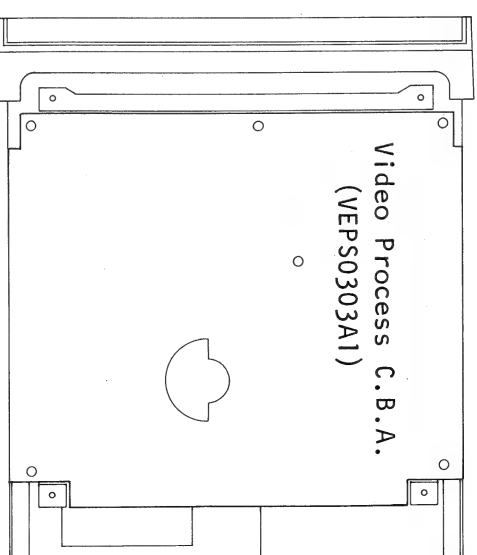
1	60Hz
2	G.N.D
3	HDDO DUB +9.5V
4	REC +9.5V
5	PR +9.5V
6	LOADING COMP (D)
7	LUMERG +9.5V
8	MULTING

P36

1	REC AUDIO DUB +9.5V
2	REC +9.5V
3	PR +9.5V
4	LOADING COMP (D)
5	LOADING COMP (D)
6	ALL MODE +9.5V
7	LP SP (D)
8	SIP (D)
9	MULTING

P33

1	PG 30Hz
2	REC +9.5V
3	PR +9.5V
4	PR RF
5	G.N.D
6	G.N.D
7	REC FM



4

3

2

1

A B C D E F

Video Section:

- Q513 (2SD638Q,R):** Video amplifier, input from P56-1 (P.B. +9.5V).
- Q514 (2SD638Q,R):** Video amplifier, input from P56-2 (REC FM).
- Q515 (2SD638Q,R):** Video switch, input from P56-5 (P.B. RF).
- Q516 (2SD638Q,R):** Video switch, input from P56-6 (GND).
- Q517 (2SD638Q,R):** Video switch, input from P56-7 (REC +9.5V).

Audio Section:

- Q518 (2SD638Q,R):** Audio amplifier, input from P56-3 (GND).
- Q519 (2SD638Q,R):** Audio amplifier, input from P56-4 (PG 30Hz).
- Q520 (2SD638Q,R):** Audio amplifier, input from P56-5 (P.B. RF).
- Q521 (2SD638Q,R):** Audio amplifier, input from P56-6 (GND).
- Q522 (2SD638Q,R):** Audio amplifier, input from P56-7 (REC +9.5V).

Power and Grounding:

- P56:** +9.5V supply, pins 1-7.
- P57:** +5V supply, pins 1-6.
- TP520 (Up):** 0.1V/5msec. div.
- P56-4 (Down):** 5V/5msec. div.
- P.B./SP Mode:** P.B. (Push Button) / SP (Standby) mode.

Waveform Trace:

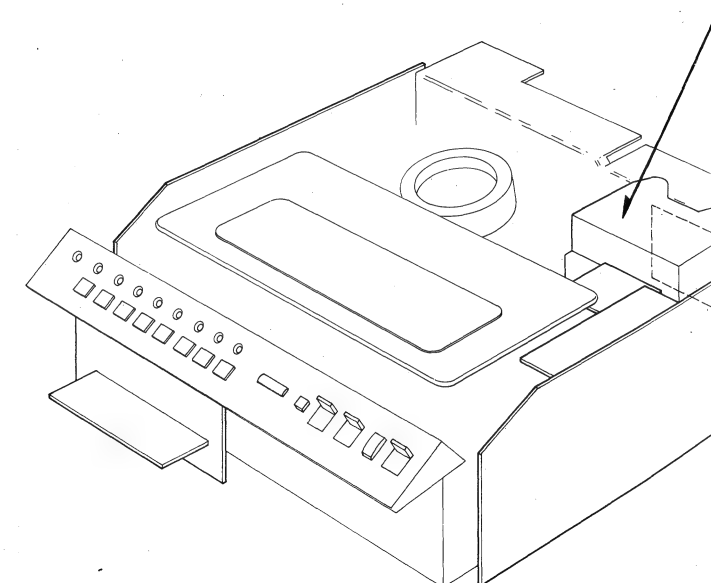
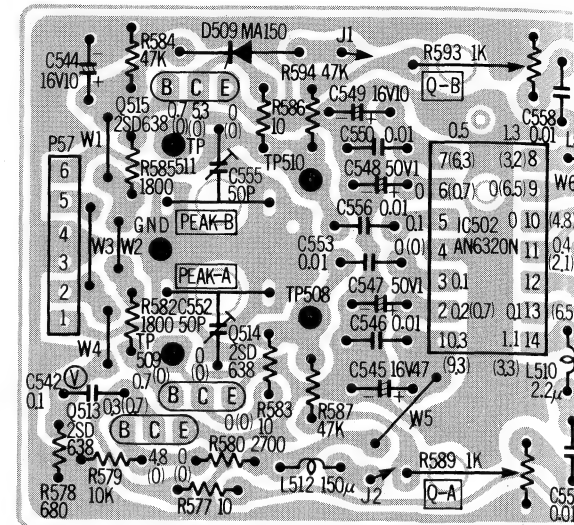
TP520 (Up) 0.1V/5msec. div.
P56-4 (Down) 5V/5msec. div.
P.B./SP Mode

Component Values:

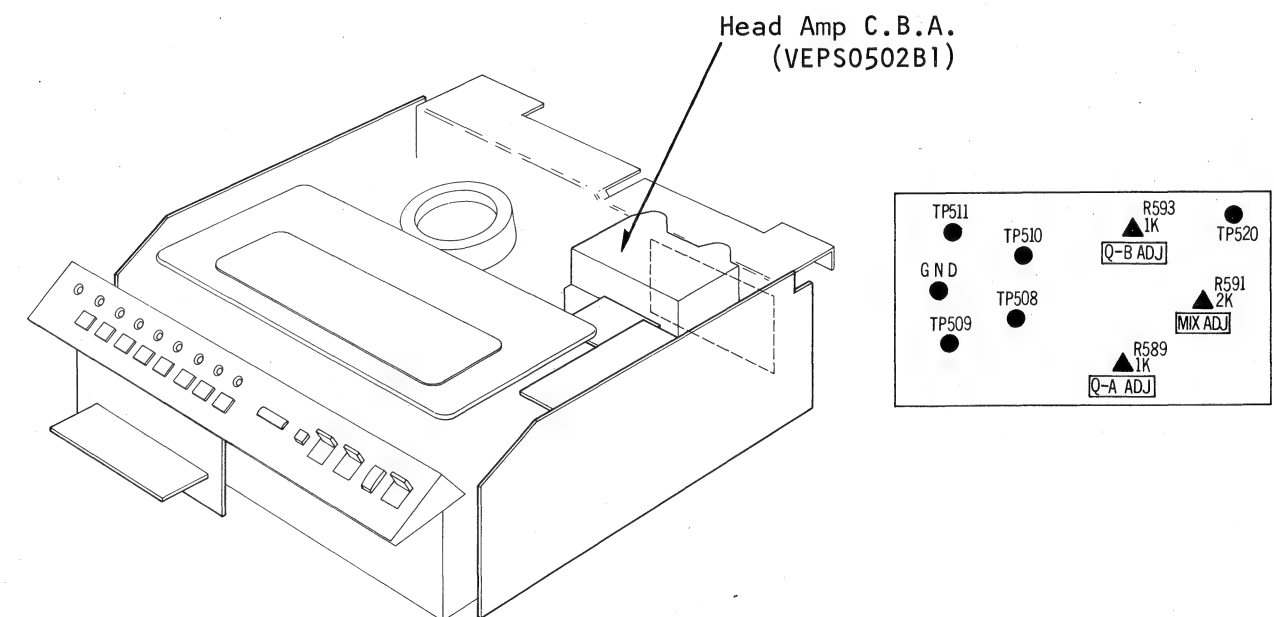
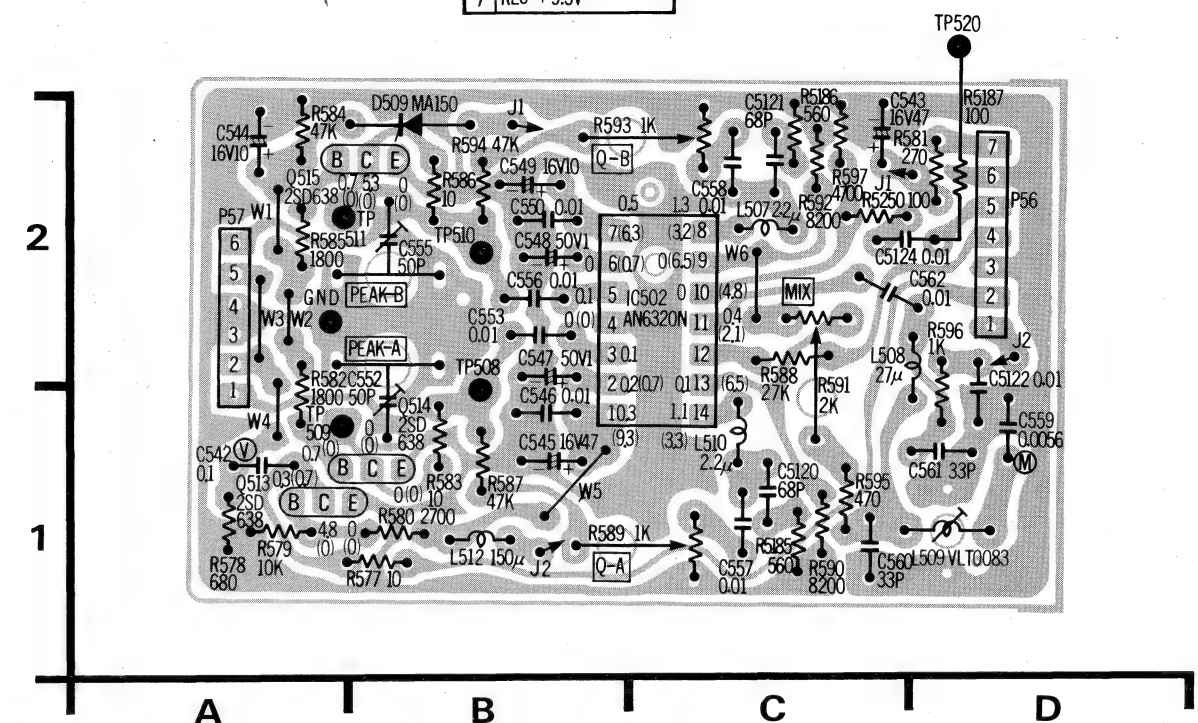
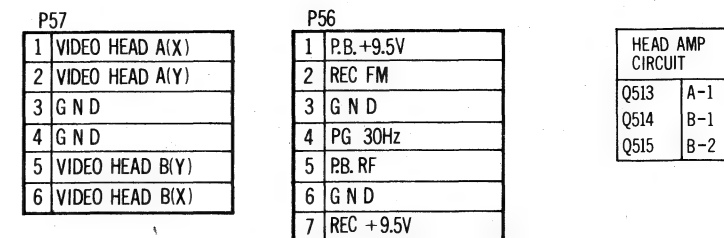
- Resistors:** R577 10, R580 2700, R579 10K, L512 150, R587 47K, R588 27K, R5185 560, R5186 560, R5187 100, R5188 100, R5189 100, R5190 100, R5191 100, R5192 100, R5193 100, R5194 100, R5195 100, R5196 100, R5197 100, R5198 100, R5199 100, R5200 100, R5201 100, R5202 100, R5203 100, R5204 100, R5205 100, R5206 100, R5207 100, R5208 100, R5209 100, R5210 100, R5211 100, R5212 100, R5213 100, R5214 100, R5215 100, R5216 100, R5217 100, R5218 100, R5219 100, R5220 100, R5221 100, R5222 100, R5223 100, R5224 100, R5225 100, R5226 100, R5227 100, R5228 100, R5229 100, R5230 100, R5231 100, R5232 100, R5233 100, R5234 100, R5235 100, R5236 100, R5237 100, R5238 100, R5239 100, R5240 100, R5241 100, R5242 100, R5243 100, R5244 100, R5245 100, R5246 100, R5247 100, R5248 100, R5249 100, R5250 100, R5251 100, R5252 100, R5253 100, R5254 100, R5255 100, R5256 100, R5257 100, R5258 100, R5259 100, R5260 100, R5261 100, R5262 100, R5263 100, R5264 100, R5265 100, R5266 100, R5267 100, R5268 100, R5269 100, R5270 100, R5271 100, R5272 100, R5273 100, R5274 100, R5275 100, R5276 100, R5277 100, R5278 100, R5279 100, R5280 100, R5281 100, R5282 100, R5283 100, R5284 100, R5285 100, R5286 100, R5287 100, R5288 100, R5289 100, R5290 100, R5291 100, R5292 100, R5293 100, R5294 100, R5295 100, R5296 100, R5297 100, R5298 100, R5299 100, R5300 100, R5301 100, R5302 100, R5303 100, R5304 100, R5305 100, R5306 100, R5307 100, R5308 100, R5309 100, R5310 100, R5311 100, R5312 100, R5313 100, R5314 100, R5315 100, R5316 100, R5317 100, R5318 100, R5319 100, R5320 100, R5321 100, R5322 100, R5323 100, R5324 100, R5325 100, R5326 100, R5327 100, R5328 100, R5329 100, R5330 100, R5331 100, R5332 100, R5333 100, R5334 100, R5335 100, R5336 100, R5337 100, R5338 100, R5339 100, R5340 100, R5341 100, R5342 100, R5343 100, R5344 100, R5345 100, R5346 100, R5347 100, R5348 100, R5349 100, R5350 100, R5351 100, R5352 100, R5353 100, R5354 100, R5355 100, R5356 100, R5357 100, R5358 100, R5359 100, R5360 100, R5361 100, R5362 100, R5363 100, R5364 100, R5365 100, R5366 100, R5367 100, R5368 100, R5369 100, R5370 100, R5371 100, R5372 100, R5373 100, R5374 100, R5375 100, R5376 100, R5377 100, R5378 100, R5379 100, R5380 100, R5381 100, R5382 100, R5383 100, R5384 100, R5385 100, R5386 100, R5387 100, R5388 100, R5389 100, R5390 100, R5391 100, R5392 100, R5393 100, R5394 100, R5395 100, R5396 100, R5397 100, R5398 100, R5399 100, R5400 100, R5401 100, R5402 100, R5403 100, R5404 100, R5405 100, R5406 100, R5407 100, R5408 100, R5409 100, R5410 100, R5411 100, R5412 100, R5413 100, R5414 100, R5415 100, R5416 100, R5417 100, R5418 100, R5419 100, R5420 100, R5421 100, R5422 100, R5423 100, R5424 100, R5425 100, R5426 100, R5427 100, R5428 100, R5429 100, R5430 100, R5431 100, R5432 100, R5433 100, R5434 100, R5435 100, R5436 100, R5437 100, R5438 100, R5439 100, R5440 100, R5441 100, R5442 100, R5443 100, R5444 100, R5445 100, R5446 100, R5447 100, R5448 100, R5449 100, R5450 100, R5451 100, R5452 100, R5453 100, R5454 100, R5455 100, R5456 100, R5457 100, R5458 100, R5459 100, R5460 100, R5461 100, R5462 100, R5463 100, R5464 100, R5465 100, R5466 100, R5467 100, R5468 100, R5469 100, R5470 100, R5471 100, R5472 100, R5473 100, R5474 100, R5475 100, R5476 100, R5477 100, R5478 100, R5479 100, R5480 100, R5481 100, R5482 100, R5483 100, R5484 100, R5485 100, R5486 100, R5487 100, R5488 100, R5489 100, R5490 100, R5491 100, R5492 100, R5493 100, R5494 100, R5495 100, R5496 100, R5497 100, R5498 100, R5499 100, R5500 100, R5501 100, R5502 100, R5503

P57 (Head Amp. C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	Video Head A(X)	Video Head (H6301)
2	Video Head A(Y)	Video Head (H6301)
3	GND	Video Head (H6301)
4	GND	Video Head (H6302)
5	Video Head B(Y)	Video Head (H6302)
6	Video Head B(X)	Video Head (H6302)

P57	P56
1 VIDEO HEAD A(X)	1 P.B.+9.5V
2 VIDEO HEAD A(Y)	2 REC FM
3 G N D	3 G N D
4 G N D	4 PG 30Hz
5 VIDEO HEAD B(Y)	5 P.B. RF
6 VIDEO HEAD B(X)	6 G N D
	7 REC +9.5V



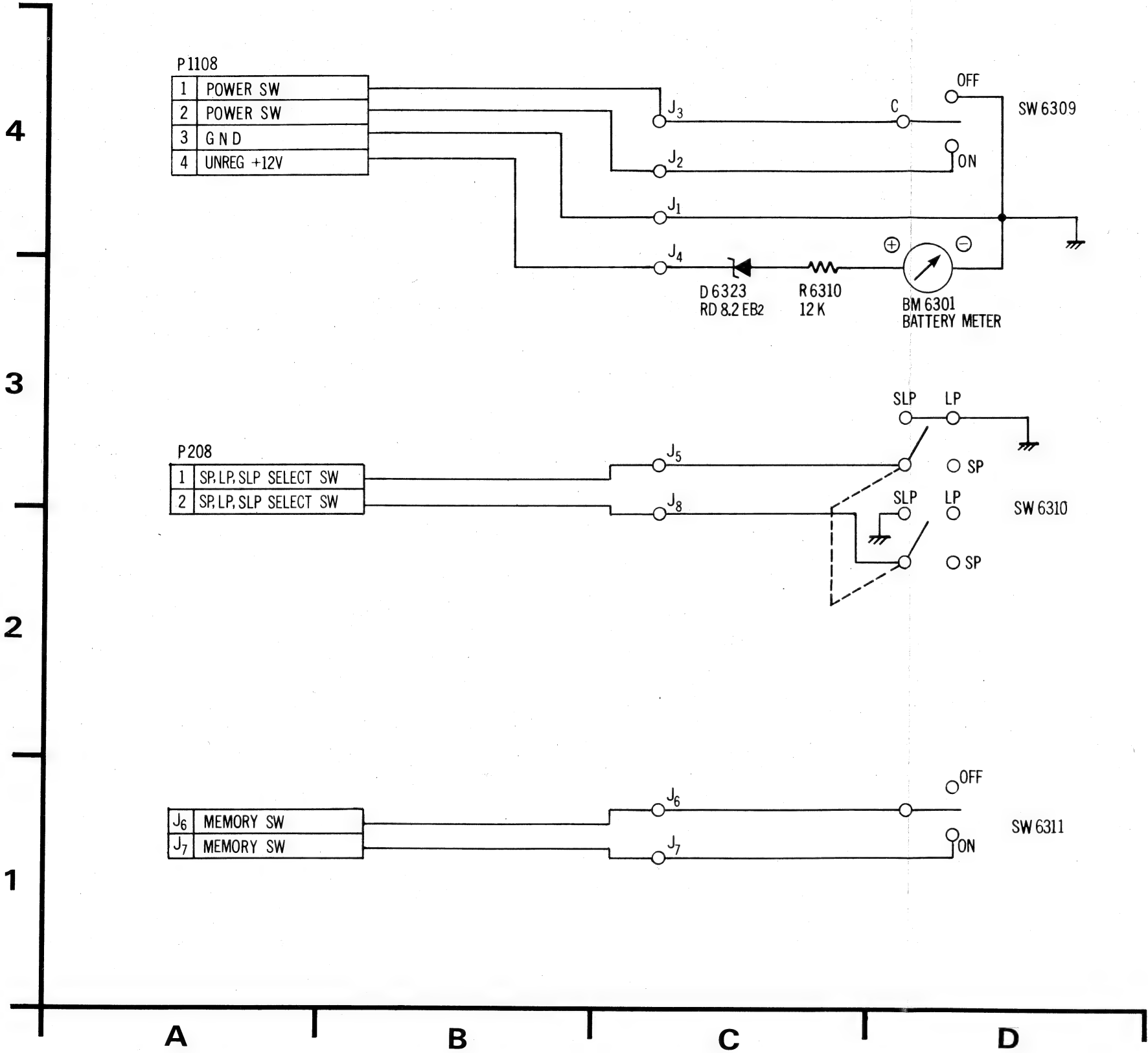
HEAD AMP C.B.A (VEPS0502 B1)



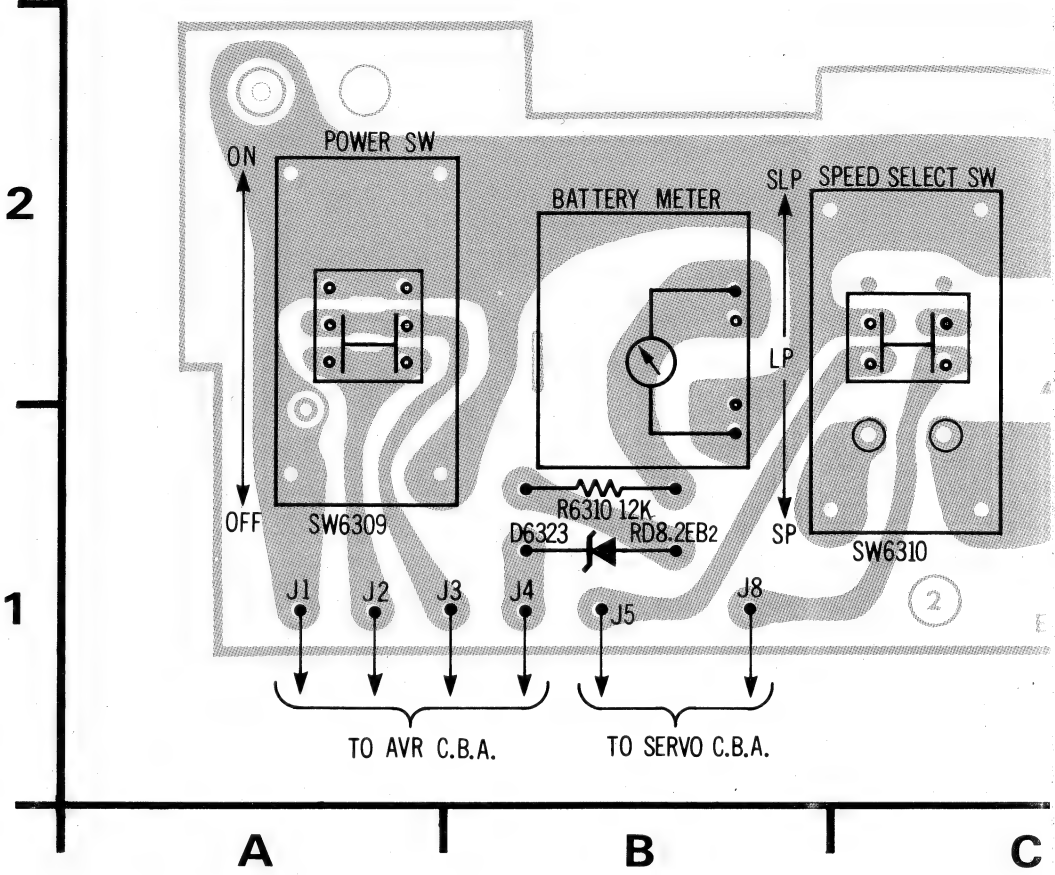
C.B.A.)	
DESTINATION	
P33-3	(Video Process C.B.A.)
P33-7	(Video Process C.B.A.)
P33-6	(Video Process C.B.A.)
P33-1	(Video Process C.B.A.)
P33-4	(Video Process C.B.A.)
P33-5	(Video Process C.B.A.)
P33-2	(Video Process C.B.A.)

P57 (Head Amp. C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	Video Head A(X)	Video Head (H6301)
2	Video Head A(Y)	Video Head (H6301)
3	GND	Video Head (H6301)
4	GND	Video Head (H6302)
5	Video Head B(Y)	Video Head (H6302)
6	Video Head B(X)	Video Head (H6302)

SWITCH CONTROL SCHEMATIC DIAGRAM

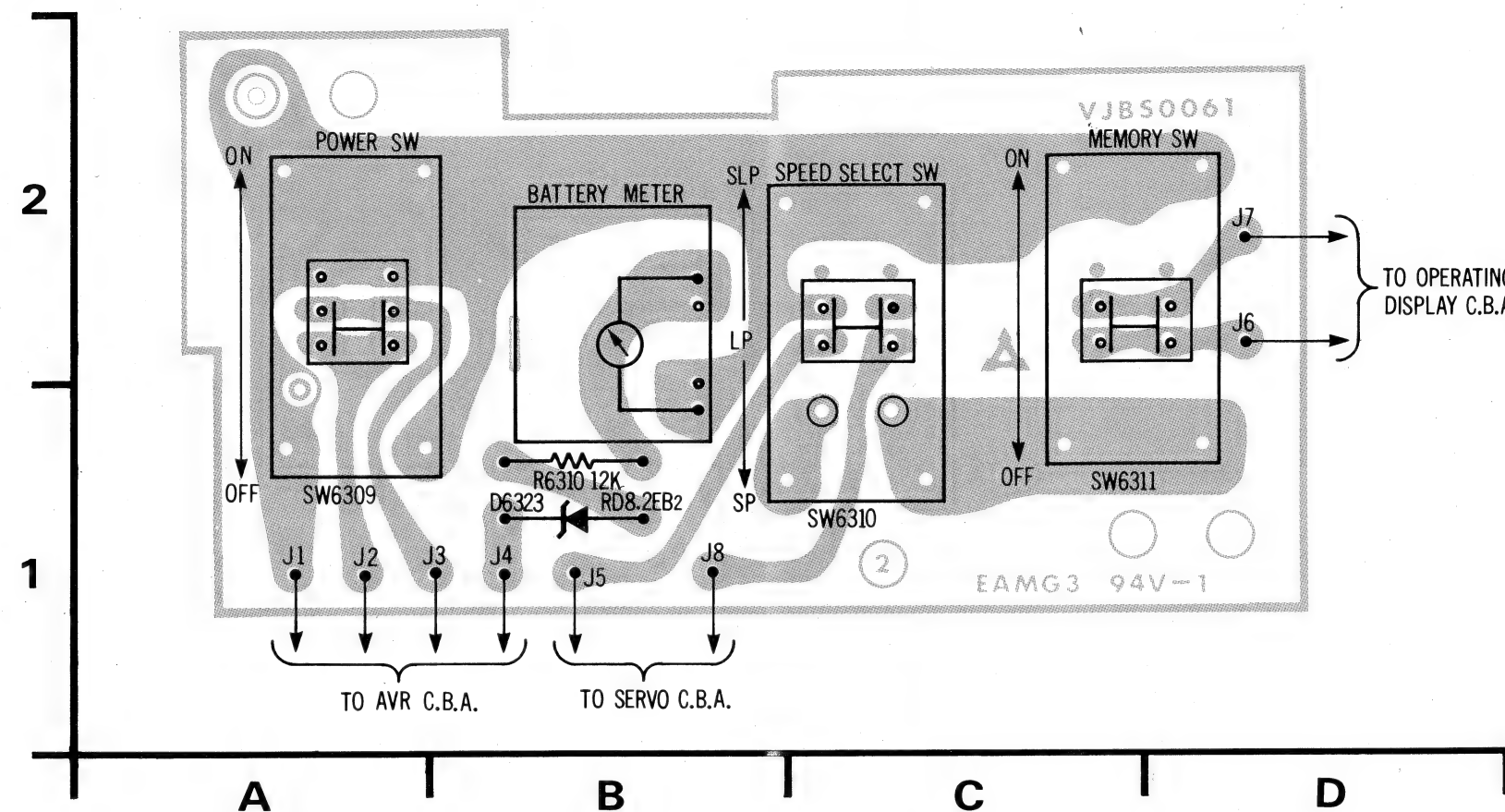
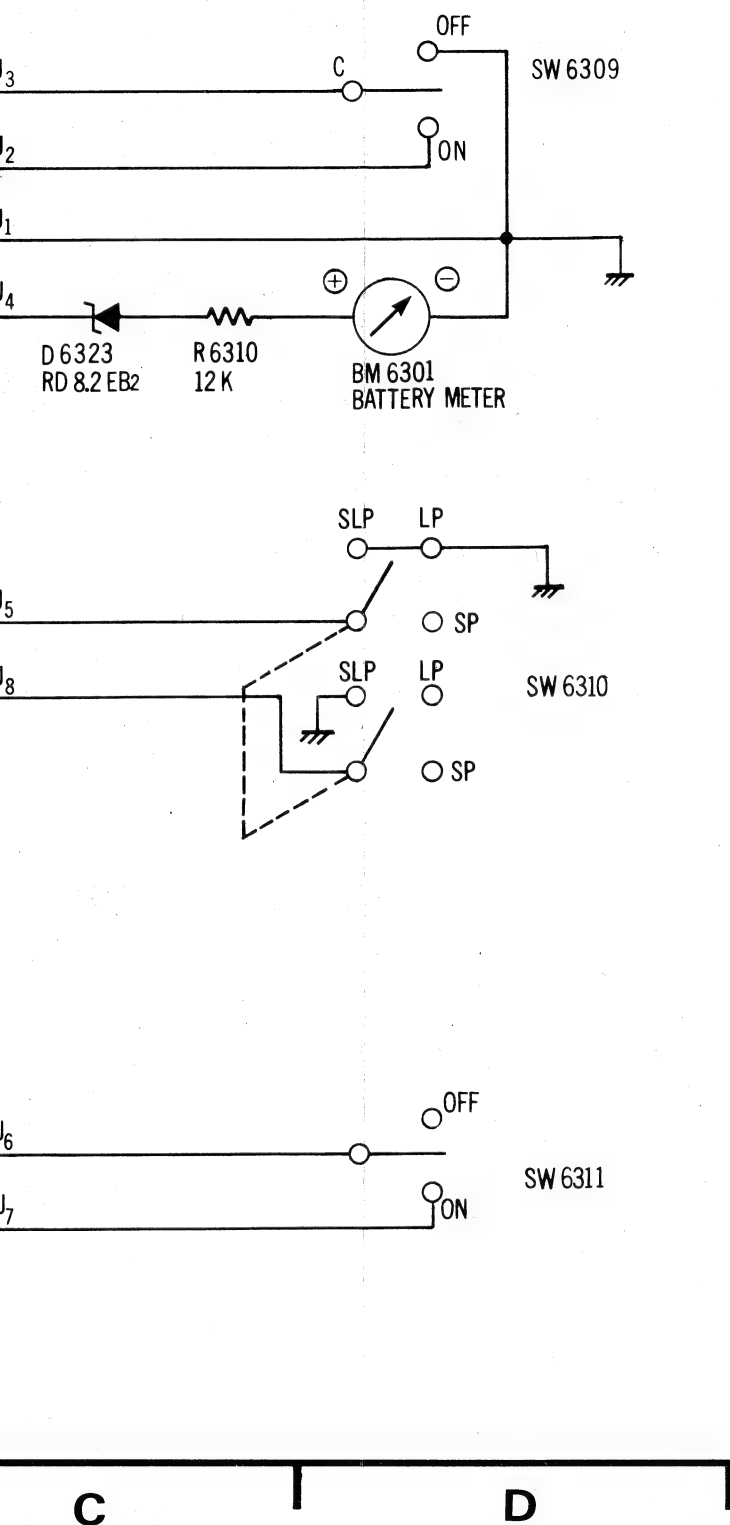


SWITCH CONTROL C.B.A (VE



(Switch Control C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
J1	GND	P1108-3 (AVR)
J2	Power SW	P1108-1 (AVR)
J3	Power SW	P1108-2 (AVR)
J4	Unreg +12V	P1108-4 (AVR)
J5	SP, LP, SLP Select SW	P208-1 (SERVO)
J8	SP, LP, SLP Select SW	P208-2 (SERVO)

(Switch Control C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
J6	Memory SW	J-19 (Key Board)
J7	Memory SW	J-18 (Key Board)

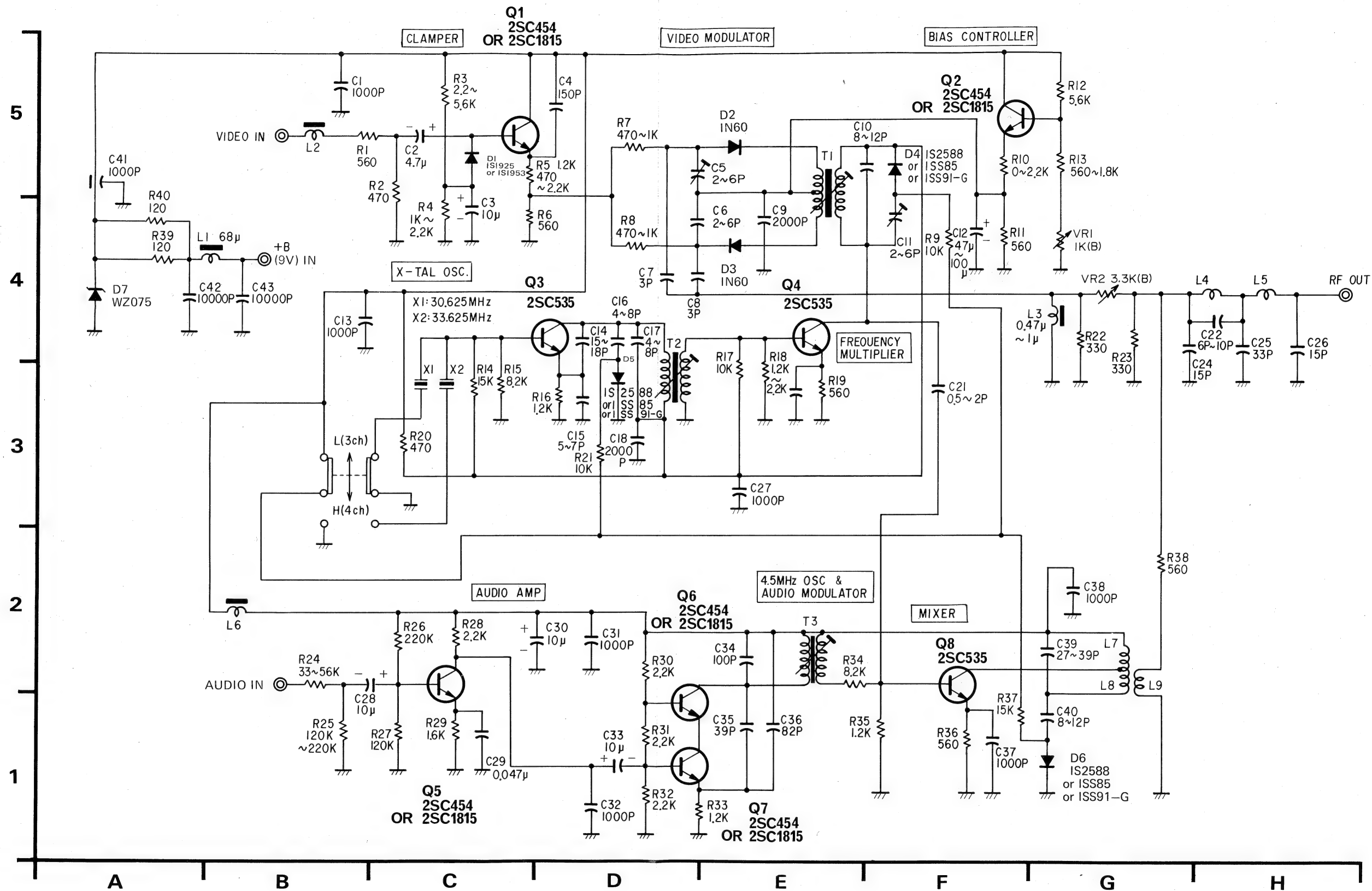


J1	GND
J2	POWER SW
J3	POWER SW
J4	UNREG +12V
J5	SP,LP,SLP SELECT SW
J6	MEMORY SW
J7	MEMORY SW
J8	SP,LP,SLP SELECT SW

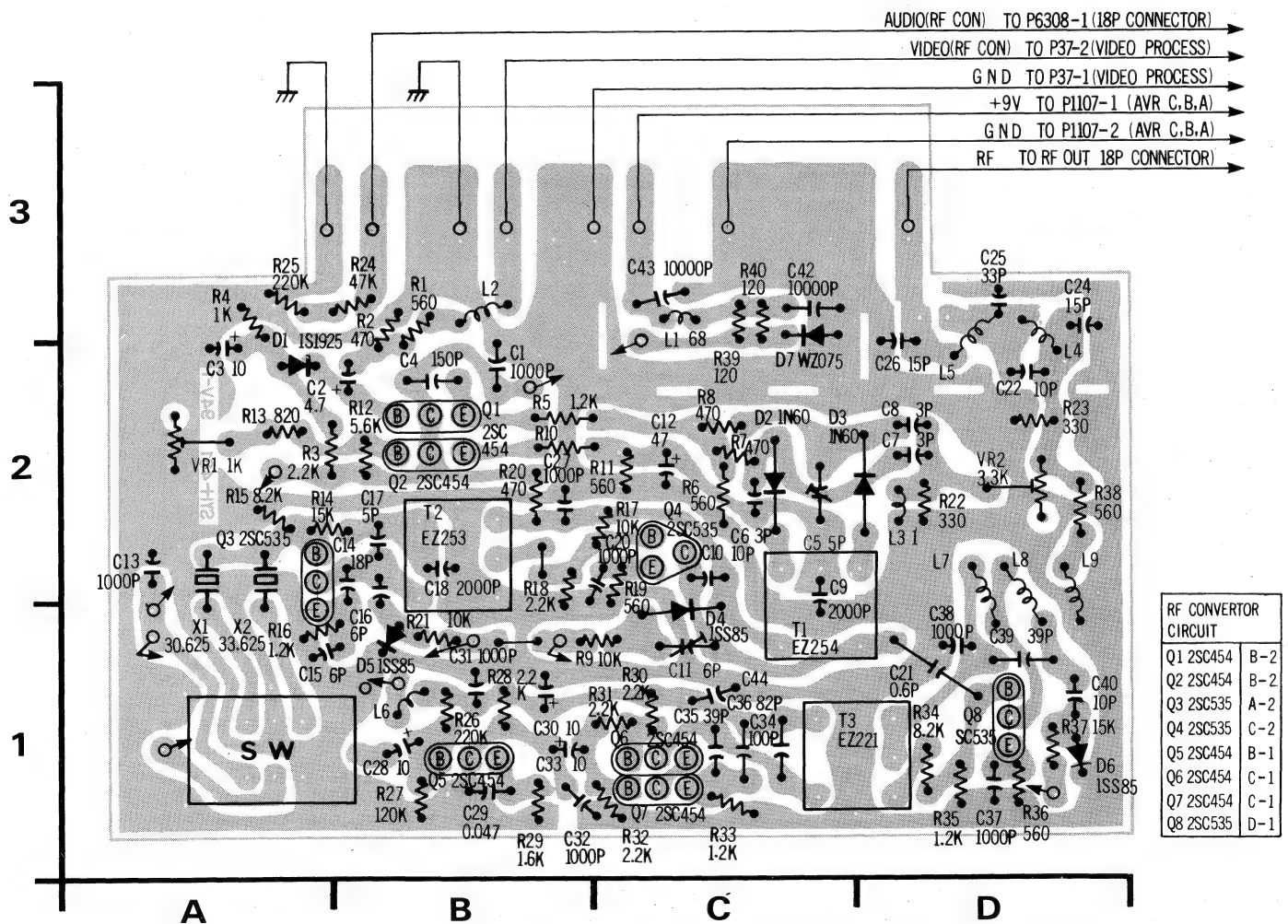
(Switch Control C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
J1	GND	P1108-3 (AVR)
J2	Power SW	P1108-1 (AVR)
J3	Power SW	P1108-2 (AVR)
J4	Unreg +12V	P1108-4 (AVR)
J5	SP, LP, SLP Select SW	P208-1 (SERVO)
J8	SP, LP, SLP Select SW	P208-2 (SERVO)

(Switch Control C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
J6	Memory SW	J-19 (Key Board)
J7	Memory SW	J-18 (Key Board)

RF CONVERTER SCHEMATIC DIAGRAM

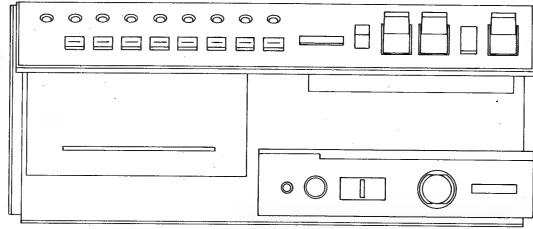


RF CONVERTER C.B.A (VEQS0103A1)



CIRCUIT BOARD LAYOUT

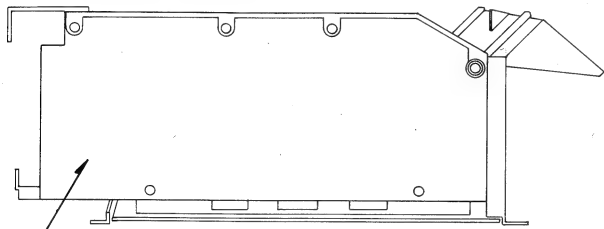
LEFT SIDE VIEW →



← RIGHT SIDE VIEW

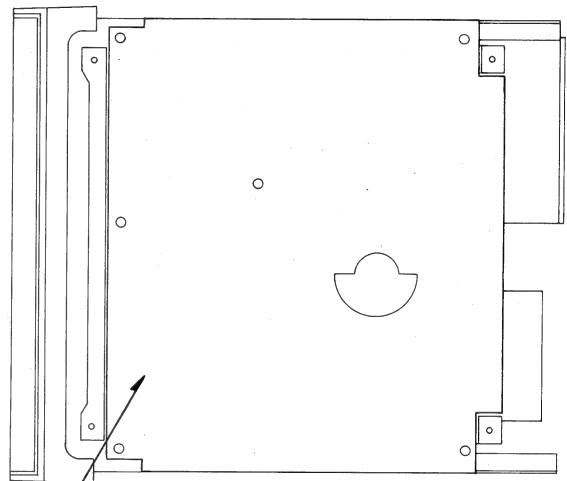
↑
BOTTOM VIEW

LEFT SIDE VIEW



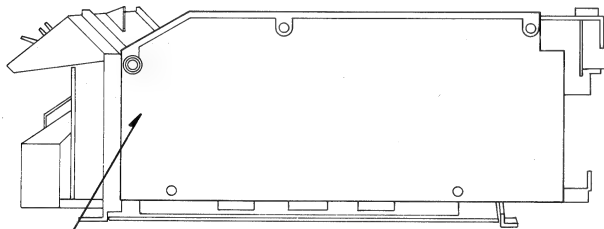
System Control C.B.A. (VEPS0601A1)

BOTTOM VIEW

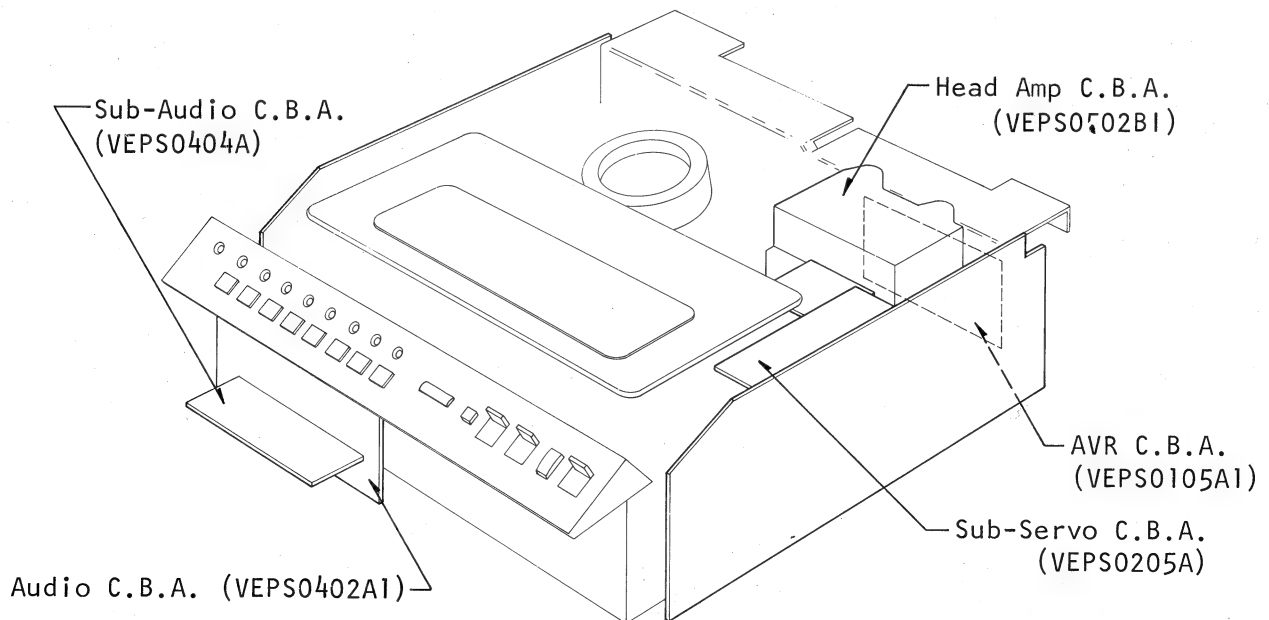


Video Process C.B.A.
(VEPS0303A1)

RIGHT SIDE VIEW

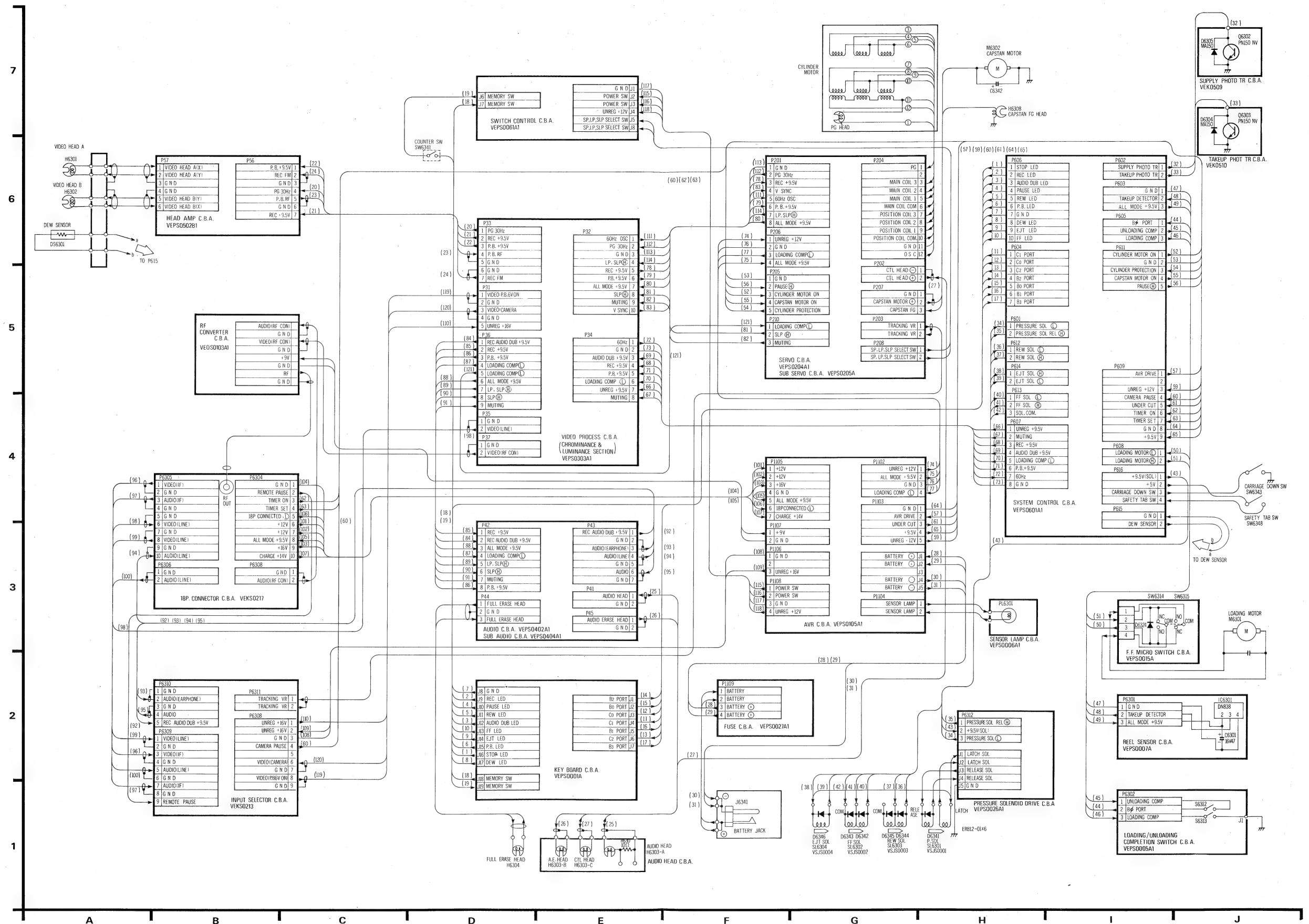


Servo C.B.A. (VEPS0204A1)



INTERCONNECTION SCHEMATIC DIAGRAM

3-41 CIRCUIT BOARD LAYOUT INTERCONNECTION SCHEMATIC DIAGRAM



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Service Manual

Vol. 4

Exploded Views Replacement Parts List

Portable Video Cassette Recorder

Panasonic **VHS**
Omnivision IV

PV-2600


SPECIFICATIONS

Power Source:	Deck: DC 12V Tuner unit: 120V AC, 60Hz	Output Level:	Video: VIDEO OUT jack (RCA) 1.0Vp-p 75Ω unbalanced Audio: LINE OUT jack (RCA) -6dB, 1kΩ unbalanced Earphone Jack -20dB, 200Ω unbalanced RF Modulated: Channel 3 or 4 72dBμ (open voltage), 75Ω unbalanced
Power Consumption:	Deck: Approx. 12 watts (Playback mode) Tuner unit: Approx. 75 watts	Video Horizontal	Resolution: Color: more than 230 lines B/W: more than 270 lines
Television System:	EIA Standard (525 lines, 60 fields) NTSC color signal	Signal-to-Noise Ratio:	Video: SP mode: better than 40dB LP mode: better than 40dB SLP mode: better than 40dB (Rohde & Schwarz noise meter) Audio: SP mode: better than 42dB LP mode: better than 40dB SLP mode: better than 40dB
Video Recording	System: 2 rotary heads, helical scanning system Luminance: FM azimuth recording Color signal: converted subcarrier phase shift recording	Operation	Temperature: 41°F—104°F (5°C—40°C) Operating Humidity: 10%—75%
Audio Track:	1 track	Weight:	Deck: 18.3 lbs. (8.3kg) Tuner unit: 12.6 lbs. (5.7kg)
Tape Format:	Tape width 1/2 inch (12.7mm), high density tape	Dimensions:	Deck: 12-1/4"(W) × 14-3/8"(D) × 5-5/8"(H) 308(W) × 362(D) × 140(H)mm Tuner unit: 7-5/8"(W) × 14-1/8"(D) × 5-5/8"(H) 192(W) × 356(D) × 140(H)mm
Tape Speed:	SP/1-5/16 i.p.s. (33.35mm/s), LP/21/32 i.p.s. (16.67mm/s), SLP/7/16 i.p.s. (11.12mm/s)	Available Tapes:	1/2" VHS video cassette tapes NV-T120 Approx. 810 ft. (257m), 2, 4 or 6 hrs. NV-T60 Approx. 417 ft. (127m), 1, 2 or 3 hrs.
Record/Playback Time:	360 min. with NV-T120		
FF/REW Time:	Less than 4.5 min. with NV-T120		
Heads:	Video: 2 rotary heads Audio/Control: 1 stationary head Erase: 1 full track erase 1 audio track erase for audio dubbing		
Input Level:	Video: VIDEO IN jack (RCA) 1.0Vp-p, 75Ω unbalanced Audio: MIC IN jack -70dB, 600Ω -70dB, 600Ω unbalanced LINE IN jack (RCA) -20dB, 100kΩ unbalanced TV Tuners: VHF input Ch2~Ch13 75Ω unbalanced UHF input Ch14~Ch83 300Ω balanced		

Weight and dimensions shown are approximate. Specifications are subject to change without notice.

Panasonic®

 Panasonic Company
Division of Matsushita Electric
Corporation of America
One Panasonic Way, Secaucus,
New Jersey 07094

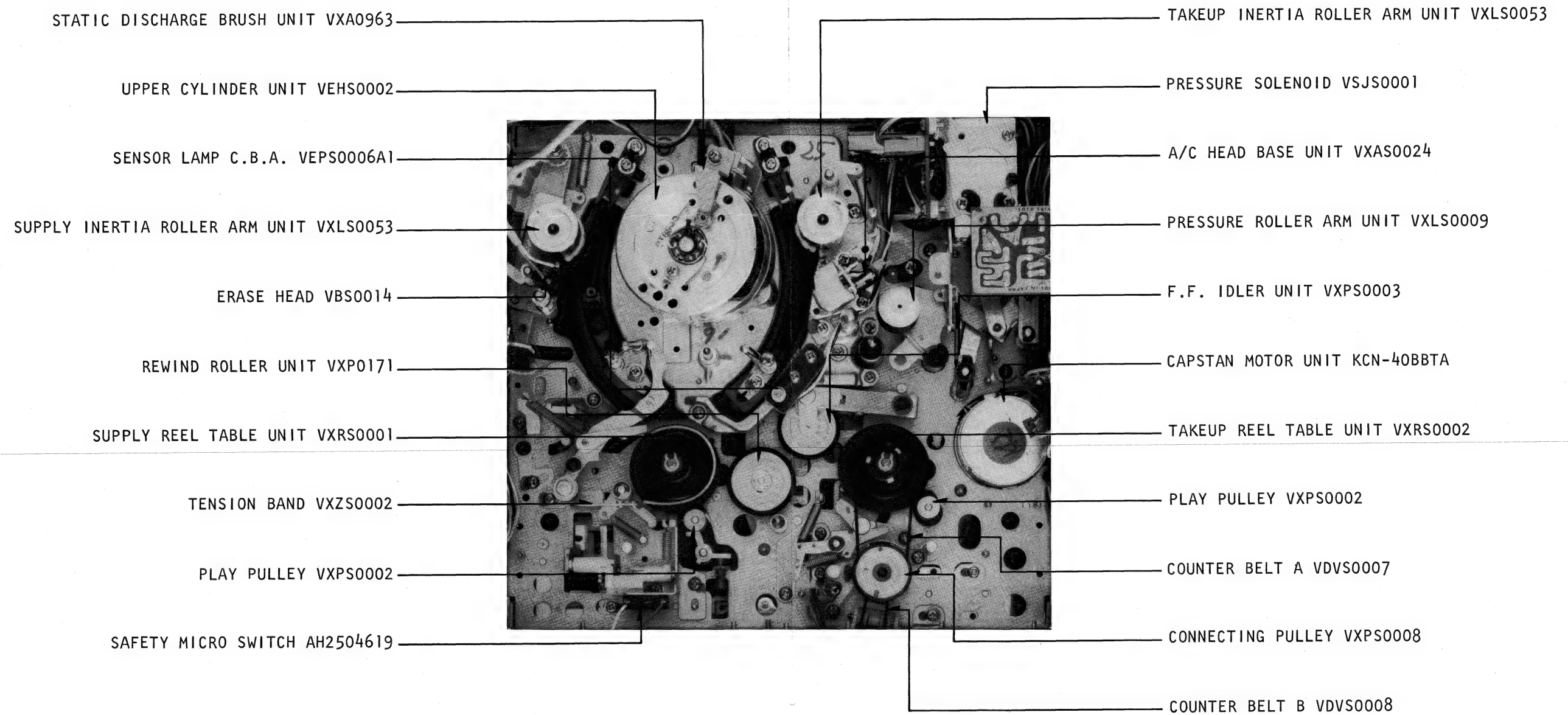
 Panasonic Hawaii, Inc.
320 Waiakamilo Road, Honolulu,
Hawaii 96817

 Matsushita Electric of Canada Limited
5770 Ambler Drive Mississauga
Ontario L4W 2K9 Canada

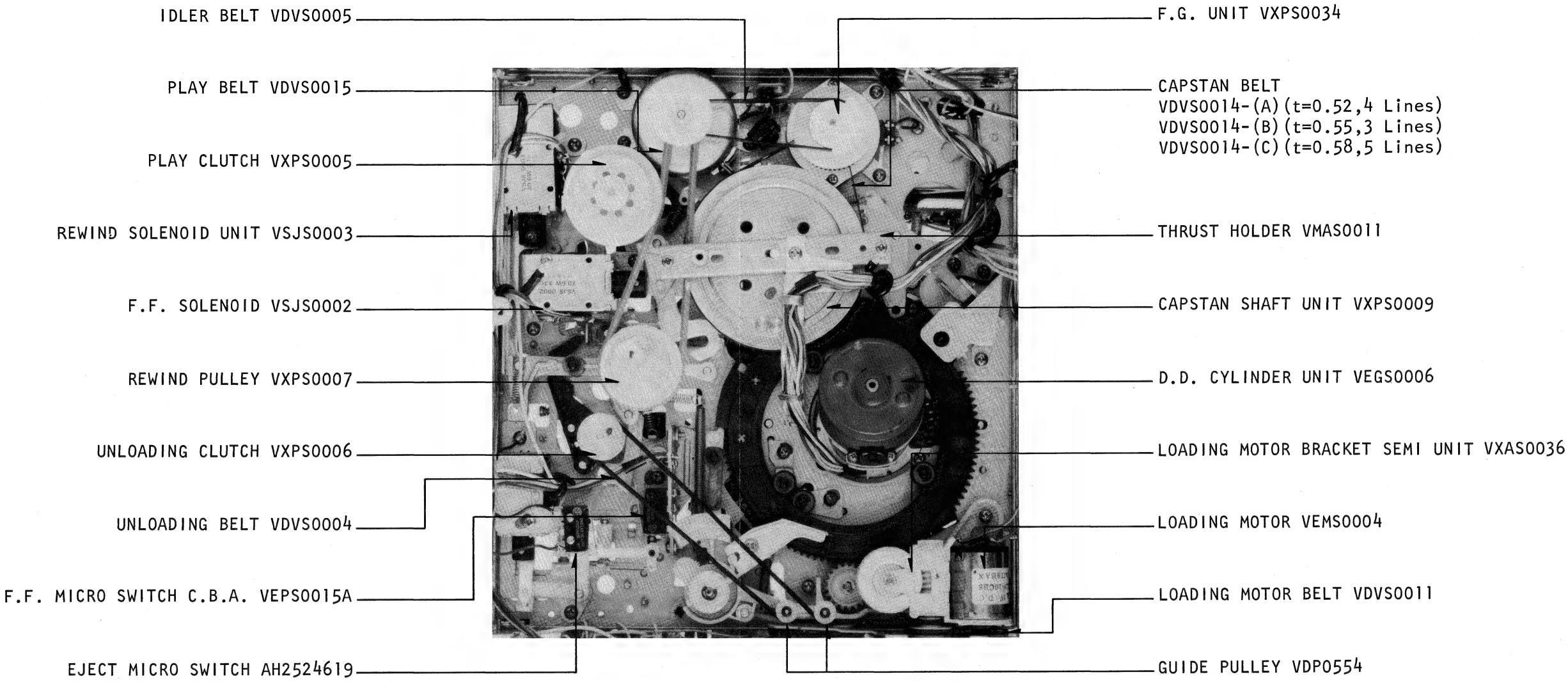
CONTENTS

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INNER PARTS LOCATION TOP VIEW



BOTTOM VIEW



EXPLODED VIEW

1. Cylinder Base Section
2. Moving Mechanism Section - (1)
3. Moving Mechanism Section - (2)
4. Chassis Frame Section
5. Casing Parts Section
6. Packing Parts & Accessory Section

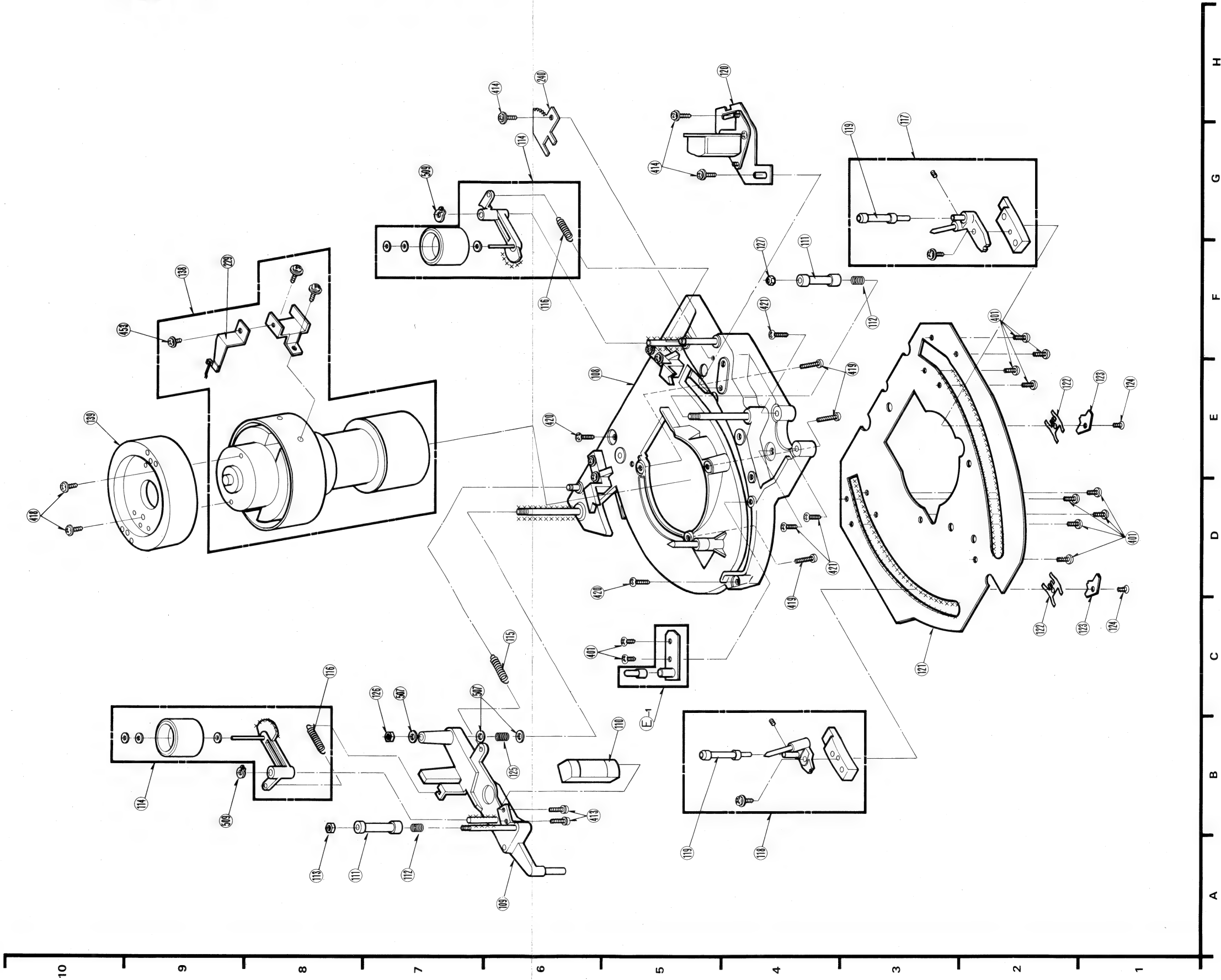
LUBRICATION POINTS

When the marked parts are replaced, apply the recommended lubricants for better maintenance of the unit.

Marks	Kind of Lubricant	Availability	Part Number
× × ×	Morlytone Grease	Available From Factory	MOR265
○ ○ ○	Spindle Oil	Purchase From Local Supplier	- - - - -

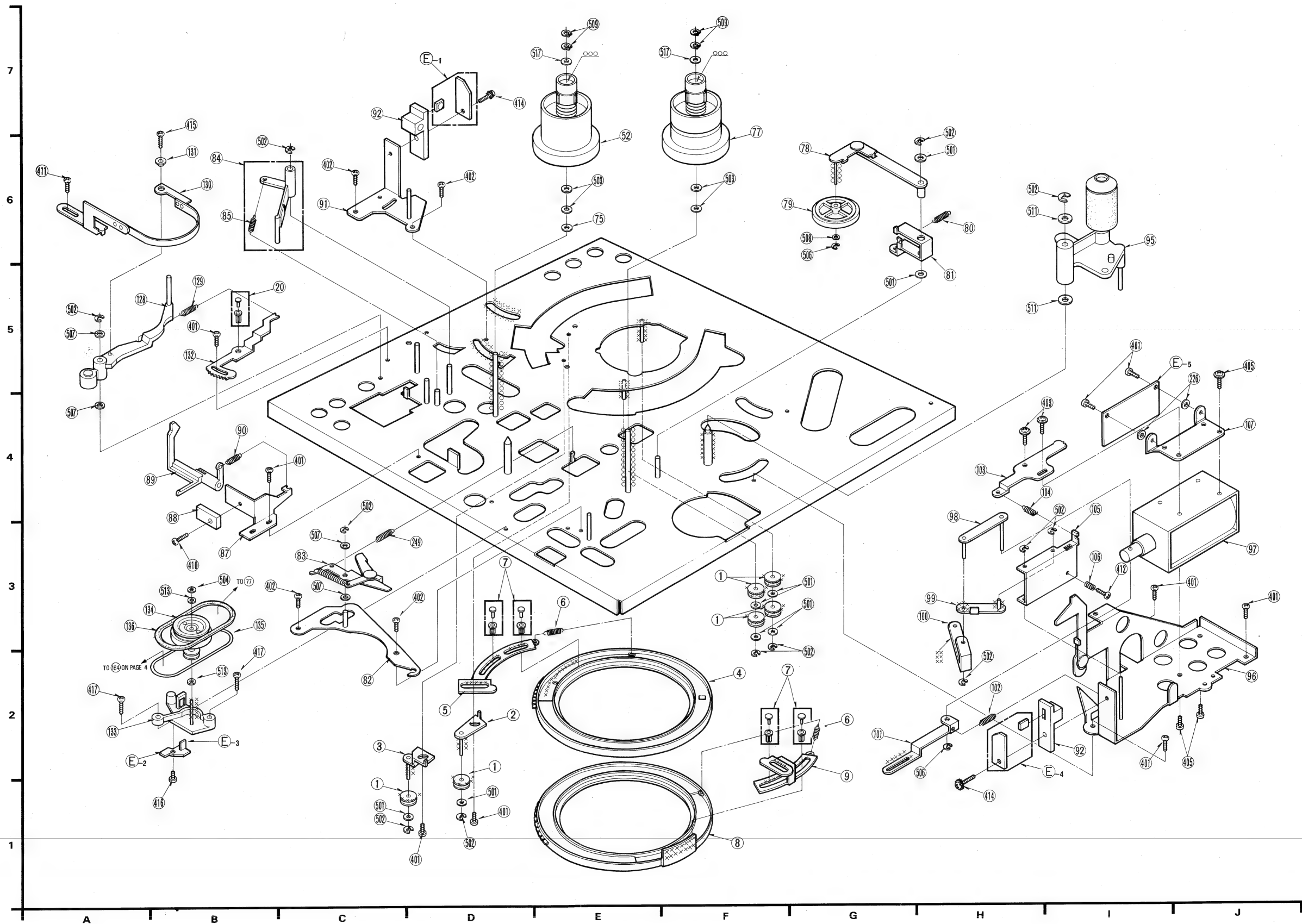
EXPLODED VIEW ① *Cylinder Base Section*

Item No.	Part No.
E-1	VEPS0006A1



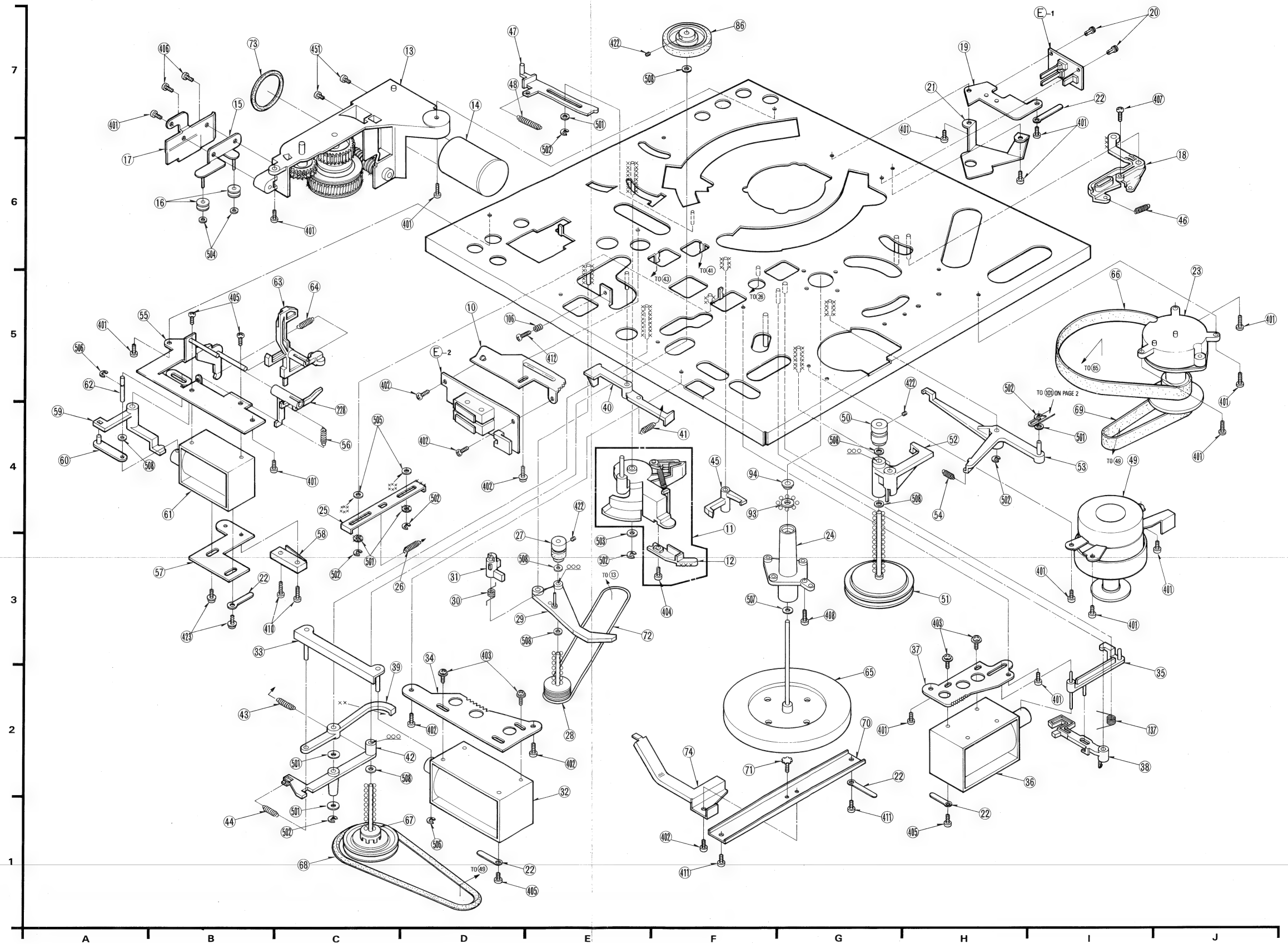
2 Moving Mechanism Section-(1)

Item No.	Part No.
E-1	VEK0509
E-2	VEPS0007A
E-3	DN838
E-4	VEK0510
E-5	VEPS0026A1



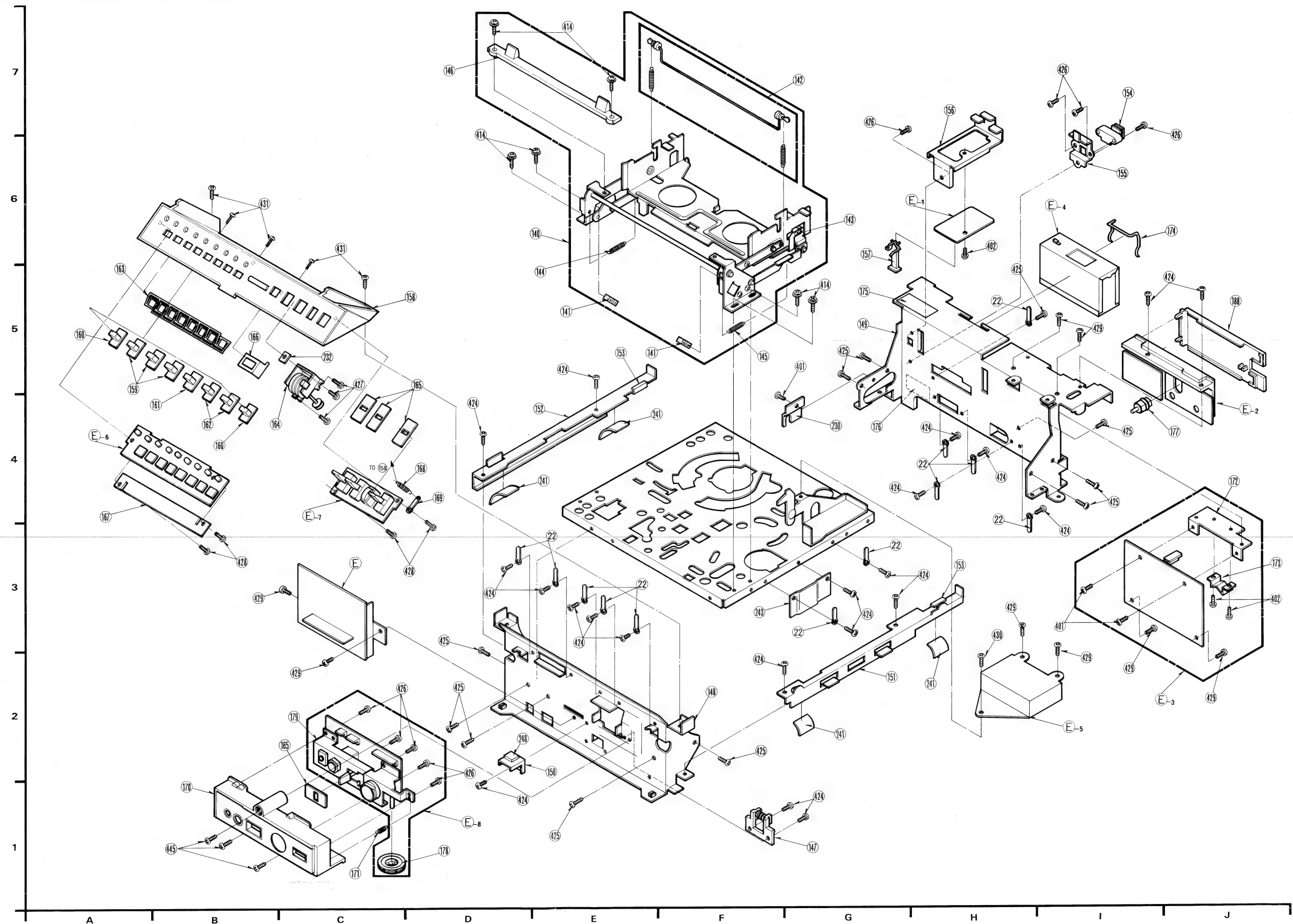
③ Moving Mechanism Section-(2)

Item No.	Part No.
E-1	VEPS0005A1
E-2	VEPS0015A

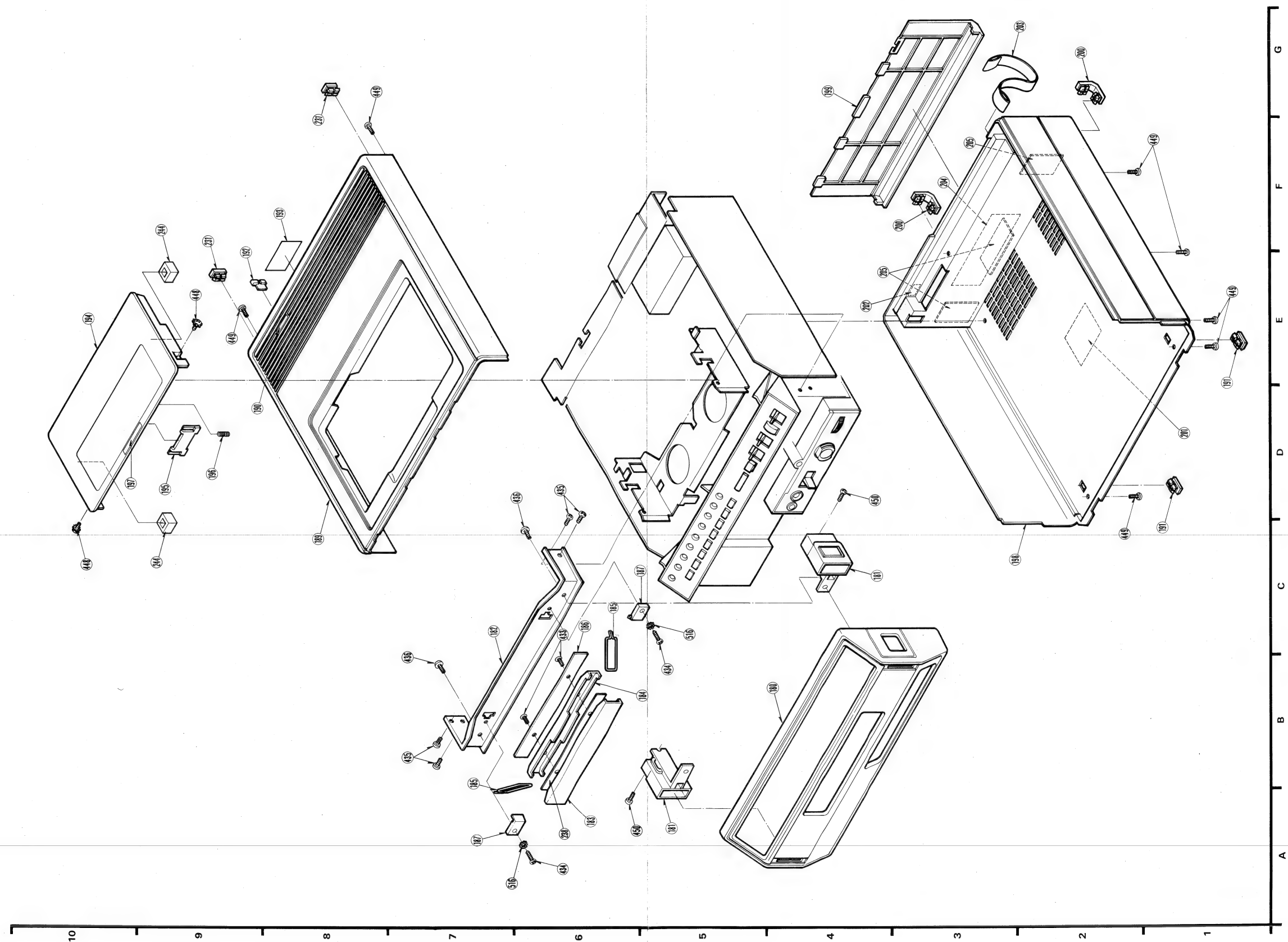


4 Chassis Frame Section

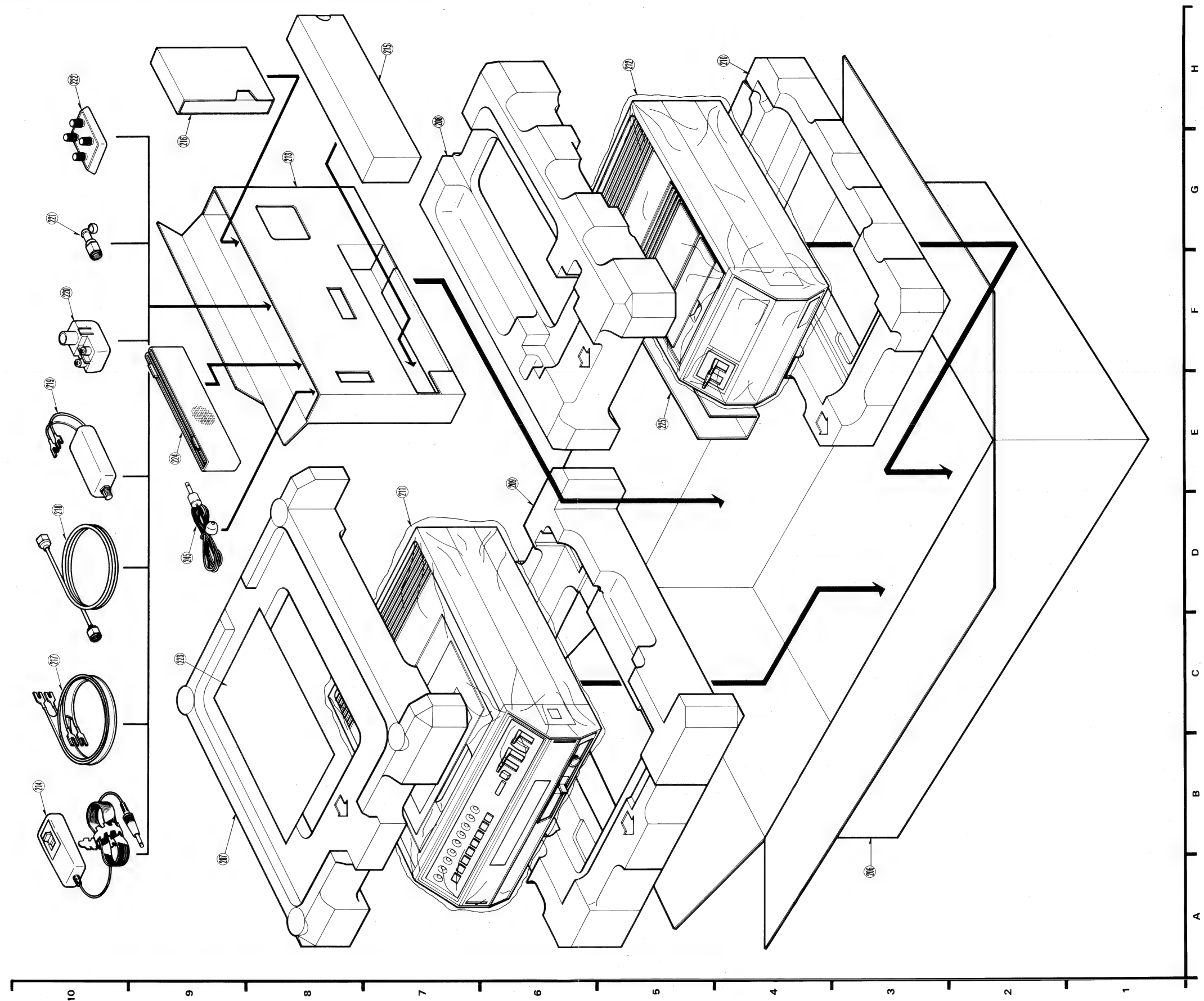
Item No.	Part No.
E-1	VEPS0027A1
E-2	VEKS0217
E-3	VEPS0105A1
E-4	VEQS0012
E-5	VEPS0502B1
E-6	VEPS0001A
E-7	VEPS0061A1
E-8	VEKS0213
E-9	VEPS1010A1



5 Casing Parts Section



⑥ Packing Parts & Accessory Section



MECHANICAL REPLACEMENT PARTS LIST

MODEL NO. PV-2600

Note: * Be sure to make your orders of replacement parts and fixtures according to this list.

- Available replacement parts.
 - △ Shown prior in parts listing.
 - × Not available as replacement parts.
 - Servicing fixtures and tools.
- (Only available on special order)

Item No.	Drawing No.	Description	Pcs/ Set	Availa- bility	Part No.	Remark
		MECHANICAL CHASSIS UNIT				
1	2	Guide Roller	4	○	VDP0006	
		GUIDE ROLLER BRACKET A UNIT				
		CONSIST OF				
2	2	1. Guide Roller Bracket A	1	○	VXAS0008	
(1)	2	2. Guide Roller	1	△	VDP0006	
(501)	2	3. Poly Slider Washer (4φ)	1	△	XWXV4D9	
(502)	2	4. Retaining Ring (3φ)	1	△	XUC3FP	
		GUIDE ROLLER BRACKET B UNIT				
		CONSIST OF				
3	2	1. Guide Roller Bracket B	1	○	VXAS0009	
(1)	2	2. Guide Roller	1	△	VDP0006	
(501)	2	3. Poly Slider Washer (4φ)	1	△	XWXV4D9	
(502)	2	4. Retaining Ring (3φ)	1	△	XUC3FP	
		LOADING RING L UNIT				
		CONSIST OF				
4	2	1. Loading Ring L	1	○	VMAS0078	
5	2	2. Loading Arm L	1	○	VMLS0003	
6	2	3. Loading Arm Spring	1	○	VMBS0026	
7	2	4. Rivet	2	○	VDB0443	

Item No.	Drawing No.	Description	Pcs/ Set	Availa- bility	Part No.	Remark
		LOADING RING R UNIT				
		CONSIST OF				
8	2	1. Loading Ring R	1	○	VMAS0079	
9	2	2. Loading Arm R	1	○	VMLS0004	
(6)	2	3. Loading Arm Spring	1	△	VMBS0026	
(7)	2	4. Rivet	1	△	VDB0443	
		F.F. MICRO SWITCH ANGLE				
		UNIT				
		CONSIST OF				
10	3	1. F.F. Micro Switch Angle	1	○	VMAS0061	
(E)	3	2. F.F. Micro Switch C.B.A.	1	△	VJPS0015A	
(402)	3	3. Tapping Screw (3φX6mm)	2	△	XTV3+6FFXS	
		Release Lever A Unit	1	○	VXLS0002	
12	3	Release Lever C	1	○	VMLS0032	
		LOADING MOTOR BRACKET UNIT				
		CONSIST OF				
13	3	1. Loading Motor Bracket	1	○	VXAS0036	
		Semi-Unit				
14	3	2. Loading Motor	1	○	VEMS0004	
15	3	3. Guide Pulley Bracket	1	○	VXAS0007	
16	3	4. Guide Pulley	2	○	VDP0554	
(504)	3	5. Snap Washer (2φ)	2	△	QBW2008	
(451)	3	6. Screw (3φX4mm)	2	△	XSN3+4FX	
17	3	7. Belt Protector	1	○	VMAS0121	
(406)	3	8. Tapping Screw (3φX6mm)	2	△	XTN3+6GGFY	
		Cam Lever	1	○	VXLS0030	
(46)	3	Cam Lever Spring	1	△	VMBS0023	
(407)	3	Tapping Screw (4φX20mm)	1	△	XTN4+20AFX	

Item No.	Drawing No.	Description	Pcs/Set	Availability	Part No.	Remark
		LEAF SWITCH BRACKET UNIT				
		CONSIST OF				
19	3	1. Leaf Switch Bracket	1	○	VMPS0014	
(E)	3	2. Leaf Switch C.B.A.	1	△	VEPS0005A1	
20	2,3	3. Plastic Rivet	2	○	VHN0011	
21	3	Leaf Switch Cover	1	○	VMAS0122	
22	3	Clamper	1	○	VJR3	
23	3	F.G. Unit	1	○	VXPS0034	
24	3	Capstan Holder Unit	1	○	VXDS0004	
25	3	Slide Angle	1	○	VMLS0025	
26	3	Slide Angle Spring	1	○	VMBS0016	
		L-SHAPE ARM UNIT				
		CONSIST OF				
27	3	1. Play Pulley	1	○	VXPS0002	
(422)	3	2. 2 Point Hex. Screw (3 ϕ X4mm)	1	△	XXE3D4FXKS	
(508)	3	3. Poly Slider Washer (3 ϕ)	2	△	XW XV3D54	
28	3	4. Unloading Clutch	1	○	VXPS0006	
29	3	5. L-Shape Arm	1	○	VXDS0005	
30	3	6. Arm Kick Spring	1	○	VMBS0004	
31	3	7. Brake Latchet	1	○	VMLS0037	
		REWIND SOLENOID UNIT				
		CONSIST OF				
32	3	1. Rewind Solenoid Unit	1	○	VSJS0003	
33	3	2. Rewind Angle	1	○	VXLS0015	
34	3	3. Rewind Solenoid Plate	1	○	VMAS0050	
(403)	3	4. Screw With Washer (3 ϕ X6mm)	2	△	XYN3+F6FXS	

Item No.	Drawing No.	Description	Pcs/Set	Availability	Part No.	Remark
(508)	3	5. Retaining Ring (2 ϕ E-Type)	1	△	XUC2FP	
(22)	3	6. Clamper	1	△	VJR3	
(405)	3	7. Screw (3 ϕ X4mm)	1	△	XSN3+4FXS	
		F.F. SOLENOIDE UNIT				
		CONSIST OF				
35	3	1. F.F. Solenoide Lever	1	○	VXLS0014	
36	3	2. F.F. Solenoide	1	○	VSJS0002	
37	3	3. F.F. Solenoide Plate	1	○	VMAS0051	
(403)	3	4. Screw With Washer (3 ϕ X6mm)	2	△	XYN3+F6FXS	
(22)	3	5. Clamper	1	△	VJR3	
(405)	3	6. Screw (3 ϕ X4mm)	1	△	XSN3+4FXS	
38	3	F.F. Lever	1	○	VMLS0041	
39	3	Rewind Brake Arm	1	○	VMLS0043	
40	3	F.F. Link Lever	1	○	VMLS0039	
41	3	F.F. Brake Release Spring	1	○	VMBS0028	
		REWIND LEVER UNIT				
		CONSIST OF				
42	3	1. Rewind Lever	1	○	VMLS0036	
43	3	2. Rewind Lever Spring	1	○	VMBS0010	
44	3	3. Rewind Roller Spring	1	○	VMBS0018	
45	3	Rewind Arm	1	○	VMLS0016	
46	3	Cam Lever Spring	1	○	VMBS0023	
47	3	Cue Head Lever	1	○	VMLS0012	

Item No.	Drawing No.	Description	Pcs/Set	Availability	Part No.	Remark	Item No.	Drawing No.	Description	Pcs/Set	Availability	Part No.	Remark
48	3	Cue Head Lever Spring	1	○	VMBS0006		62	3	10. Eject Solenoid Pin	1	○	VMSS0016	
							(506)	3	11. Retaining Ring	1	△	XUC2FP	
									(2 ^Φ E-Type)				
49	3	Capstan Motor	1	○	KCN-40BBTA		(405)	3	12. Screw (3 ^Φ X4mm)	2	△	XSN3+4FXS	
(401)	3	Tapping Screw (3 ^Φ X8mm)	3	△	XTV3+8FFXS		(508)	3	13. Poly Slider Washer (3 ^Φ)	1	△	XWV3D54	
							(423)	3	14. Screw With Washer (3 ^Φ X4mm)	2	△	XYN3+C4FXS	
		PLAY ARM UNIT					63	3	15. Lock Lever A	1	○	VMLS0048	
		CONSIST OF					64	3	16. Lock Lever A Spring	1	○	VMBS0005	
50	3	1. Play Pulley	1	○	VXPS0002								
51	3	2. Play Clutch	1	○	VXPS0005		65	3	Capstan Shaft Unit	1	○	VXPS0009	
52	3	3. Play Arm	1	○	VXDS0006		66	3	Capstan Belt (A)	1	○	VDVS0014-(A)	
(422)	3	4. 2 Point Hex. Screw (3 ^Φ X4mm)	1	△	XXE3D4FXKS				(t=0.52 4 Lines)				
(508)	3	5. Poly Slider Washer (3 ^Φ)	2	△	XWV3D54		(66)	3	Capstan Belt (B)	(1)	○	VDVS0014-(B)	
									(t=0.55 3 Lines)				
							(66)	3	Capstan Belt (C)	(1)	○	VDVS0014-(C)	
									(t=0.58 5 Lines)				
		PLAY BRAKE ARM UNIT					67	3	Rewind Pulley	1	○	VXPS0007	
		CONSIST OF					68	3	Play Belt	1	○	VDVS0015	
53	3	1. Play Brake Arm	1	○	VXLS0056		69	3	Idler Belt	1	○	VDVS0005	
54	3	2. Play Brake Arm Spring	1	○	VMBS0008								
		EJECT SOLENOID UNIT							THRUST HOLDER UNIT				
		CONSIST OF							CONSIST OF				
55	3	1. Eject Solenoid Plate	1	○	VXAS0010		70	3	1. Thrust Holder	1	○	VMAS0011	
56	3	2. Lock Lever B Spring	1	○	VMBS0003		71	3	2. Capstan Shaft Adjust Screw	1	○	VMPS0011	
57	3	3. Cassette Switch Plate	1	○	VMAS0065								
58	3	4. Micro Switch	1	○	AH2524619		(22)	3	3. Clamper	1	△	VJR3	
(410)	3	5. Tapping Screw (2 ^Φ X10mm)	2	△	XYN2+C10FXS		(402)	3	4. Tapping Screw (3 ^Φ X6mm)	1	△	XTV3+6FFXS	
(228)	3	6. Lock Lever B	1	△	VMLS0015								
59	3	7. Lock Release Lever	1	○	VMLS0014								
60	3	8. Connecting Lever	1	○	VMLS0022		72	3	Unloading Belt	1	○	VDVS0004	
61	3	9. Eject Solenoid	1	○	VSJS0004		73	3	Loading Motor Belt	1	○	VDVS0011	
							74	3	Lead Wire Protector Angle	1	○	VMAS0068	

Item No.	Drawing No.	Description	Pcs/ Set	Availability	Part No.	Remark	Item No.	Drawing No.	Description	Pcs/ Set	Availability	Part No.	Remark
75	2	Thrust Bearing	1	○	VDB0364		91	2	1. Base Unit	1	○	VXAS0014	
76	2	Supply Reel Table Unit	1	○	VXRS0001		92	2	2. Transistor Holder	1	○	VMA2568	
77	2	Takeup Reel Table Unit	1	○	VXRS0002		(E)	2	3. Supply Photo TR. C.B.A.	1	△	VEK0509	
							(414)	2	4. Screw With Washer (3φX8mm)	1	△	XYN3+F8FXS	
		F.F. IDLER LEVER UNIT											
		CONSIST OF											
78	2	1. F.F. Idler Lever	1	○	VXLS0012		93	3	Oil Pool	1	○	VMT0022	
79	2	2. F.F. Idler Unit	1	○	VXPS0003		94	3	Oil Cap	1	○	VMX0123	
(508)	2	3. Poly Slider Washer (3φ)	1	△	XWXV3D54		95	2	Pressure Roller Arm Unit	1	○	VXLS0009	
(506)	2	4. Retaining Ring (2φE-Type)	1	△	XUC2FP				PRESSURE ROLLER SOLENOID UNIT				
80	2	5. F.F. Idler Spring	1	○	VMBS0036				CONSIST OF				
81	2	6. F.F. Idler Lever B	1	○	VMLS0050		96	2	1. Pressure Solenoid Base Unit	1	○	VXAS0012	
82	2	Reel Brake Base Plate	1	○	VXAS0043		97	2	2. Pressure Solenoid	1	○	VSJS0001	
83	2	Reel Brake Lever	1	○	VXAS0044		98	2	3. Solenoid Center Arm	1	○	VXLS0007	
84	2	F.F. Brake Lever Unit	1	○	VXLS0010		99	2	4. Solenoid Right Arm	1	○	VXLS0006	
85	2	F.F. Brake Spring	1	○	VMBS0009		100	2	5. Solenoid Left Arm	1	○	VXLS0005	
86	3	Rewind Roller Unit	1	○	VXP0171		101	2	6. Solenoid Lower Arm	1	○	VMLS0020	
							102	2	7. Solenoid Return Spring	1	○	VMBS0012	
							103	2	8. Spring Hook Angle	1	○	VMAS0063	
		MIS-ERASE PROTECTION					104	2	9. Pressure Lever Spring	1	○	VMBS0037	
		SWITCH UNIT					105	2	10. Pressure Lever	1	○	VMLS0023	
		CONSIST OF					106	2	11. Adjust Spring	2	○	VMBO404	
87	2	1. Switch Angle	1	○	VXAS0013		(412)	2	12. Screw (3φX12mm)	1	△	XSN3+12FXS	
88	2	2. Micro Switch	1	○	AH2504619		(405)	2	13. Screw (3φX4mm)	3	△	XSN3+4FXS	
(410)	2	3. Tapping Screw (2φX10mm)	1	△	XYN2+C10FXS		(506)	2	14. Retaining Ring (2φE-Type)	1	△	XUC2FP	
89	2	4. Switch Lever	1	○	VMLS0013		(502)	2	15. Retaining Ring (3φE-Type)	3	△	XUC3FP	
90	2	5. Switch Lever Spring	1	○	VMBS0033		(403)	2	16. Screw With Washer (3φX6mm)	2	△	XYN3+F6FXS	
		SUPPLY PHOTO TR. BASE UNIT					(E)	2	17. Supply Photo TR. C.B.A.	1	△	VEK0510	
		CONSIST OF					(92)	2	18. Transistor Holder	1	△	VMA2568	

Item No.	Drawing No.	Description	Pcs/Set	Availability	Part No.	Remark	Item No.	Drawing No.	Description	Pcs/Set	Availability	Part No.	Remark
(414)	2	19. Screw With Washer (3 ϕ X8mm)	1	\triangle	XYN3+F8FXS		126	1	22. Adjust Nut	1	\bigcirc	VHNS0004	
107	2	20. Board Mounting Angle	1	\bigcirc	VMAS0100		(414)	1	23. Screw With Washer (3 ϕ X8mm)	3	\triangle	XYN3+F8FXS	
(E)	2	21. Pressure Solenoid C.B.A.	1	\triangle	VEPS0026A1		127	1	24. Adjust Nut	1	\bigcirc	VHN0008	
(401)	2	22. Tapping Screw (3 ϕ X8mm)	2	\triangle	XTV3+8FFXS		(240)	1	25. Adjust Plate	1	\triangle	VMAS0304	
(226)	2	23. Spacer	2	\triangle	VMX0204				TENSION ARM UNIT				
									CONSIST OF				
108	1	CYLINDER BASE UNIT	1	\bigcirc	VVKS0002		128	2	1. Tension Arm	1	\bigcirc	VXLS0004	
							129	2	2. Tension Arm Spring	1	\bigcirc	VMBS0007	
							130	2	3. Tension Band	1	\bigcirc	VXZS0002	
							131	2	4. Band Hook Collar	1	\bigcirc	VMXS0002	
		ERASE HEAD ARM UNIT					(415)	2	5. Screw (2 ϕ X4mm)	1	\triangle	XSN2+4FXS	
		CONSIST OF											
109	1	1. Erase Head Arm	1	\bigcirc	VXLS0055		132	2	Tension Spring Hook	1	\bigcirc	VMAS0058	
110	1	2. Erase Head	1	\bigcirc	VBS0014		(20)	2	Plastic Rivet	1	\triangle	VHN0011	
(413)	1	3. Screw (2 ϕ X6mm)	2	\triangle	XYN2+C6FXS				REEL SENSOR UNIT				
111	1	4. Post Sleeve	2	\bigcirc	VMXS0003				CONSIST OF				
112	1	5. Post SPRING	1	\bigcirc	VMB0489		133	2	1. Reel Sensor Base	1	\bigcirc	VXAS0025	
113	1	6. Adjust Nut	1	\bigcirc	VHNS0001		134	2	2. Counter Pulley	1	\bigcirc	VXPS0008	
114	1	7. Inertia Roller Arm Unit	2	\bigcirc	VXLS0053		135	2	3. Counter Belt B	1	\bigcirc	VDVS0008	
(509)	1	8. Retaining Ring (4 ϕ)	2	\triangle	XUEV4FP		(513)	2	4. Poly Slider Washer (2 ϕ)	2	\triangle	XWXV2D4	
115	1	9. Arm Return Spring	1	\bigcirc	VMBS0013		(504)	2	5. Snap Washer (2 ϕ)	1	\triangle	QBW2008	
(401)	1	10. Tapping Screw (3 ϕ X8mm)	9	\triangle	XTV3+8FFXS		(E)	2	6. Reel Sensor C.B.A.	1	\triangle	VEPS0007A	
116	1	11. Inertia Roller SPRING	2	\bigcirc	VMBS0014		(E)	2	7. Hall IC	1	\triangle	DN838	
117	1	12. Loading Post R Unit	1	\bigcirc	VVXS0004		(416)	2	8. Tapping Screw (2 ϕ X8mm)	1	\triangle	XTN2+8JFX	
118	1	13. Loading Post L Unit	1	\bigcirc	VVXS0005								
119	1	14. Roller Post Unit	2	\bigcirc	VXA0743		136	2	Counter Belt A	1	\bigcirc	VDVS0007	
120	1	15. A/C Head Base Unit	1	\bigcirc	VXAS0024		137	2	F.F. Lever Kick Spring	1	\bigcirc	VMBS0040	
121	1	16. Loading Base	1	\bigcirc	VMAS0077		138	1	D.D. Cylinder Unit	1	\bigcirc	VEGS0006	
122	1	17. Shaft Holder Spring	2	\bigcirc	VMA2560		139	1	Upper Cylinder Unit	1	\bigcirc	VEHS0002	
123	1	18. Protector	2	\bigcirc	VMA3106		(E)	1	Sensor Lamp C.B.A.	1	\triangle	VEKS0043	
124	1	19. Shaft Holder Screw	2	\bigcirc	VHDS0001		(229)	1	Static Discharge Brush	1	\triangle	VXA0963	
(507)	1	20. Poly Slider Washer (4 ϕ)	3	\triangle	XWXV4D65				Unit				
125	1	21. Post Spring	2	\bigcirc	VMB0489								

Item No.	Drawing No.	Description	Pcs/ Set	Availability	Part No.	Remark	Item No.	Drawing No.	Description	Pcs/ Set	Availability	Part No.	Remark
		CASSETTE UP HOLDER UNIT					157	4	Fuse Clamper	1	○	VMES0002	
		CONSIST OF											
140	4	1. Cassette Up Unit	1	○	VXAS0103								
141	4	2. Stand Cushion	2	○	VMG0170				OPERATION PANEL UNIT				
142	4	3. Cassette Hold Roller	1	○	VXMS0002				CONSIST OF				
		Unit					158	4	1. Panel Unit	1	○	VYFS0018	
143	4	4. Lock Release Lever	1	○	VXLS0020		159	4	2. Operation Button	3	○	VGUS0032	
144	4	5. Cassette Up Spring L	1	○	VMBS0021				(Black)				
145	4	6. Cassette Up Spring R	1	○	VMBS0020		160	4	3. Operation Button (Blue)	2	○	VGUS0036	
146	4	7. Cassette Guide	1	○	VGQS0008		161	4	4. Operation Button	1	○	VGUS0037	
(414)	4	8. Screw With Washer	2	△	XYN3+F8FXS				(Green)				
		(3 ^φ X8mm)					162	4	5. Operation Button (Red)	2	○	VGUS0035	
							163	4	6. Button Spring	1	○	VMBS0032	
							164	4	7. Tape Counter	1	○	SMF-390-006	
147	4	Counter Belt Pulley Unit	1	○	VXAS0029		(427)	4	8. Tapping Screw	3	△	XTN26+10B	
									(2.6 ^φ X10mm)				
148	4	Front Frame Unit	1	○	VXAS0030		(E)	4	9. Switch C.B.A.	1	△	VEPS0061A1	
149	4	Rear Frame Unit	1	○	VXAS0031		(E)	4	10. Operation C.B.A.	1	△	VEPS0001A1	
(22)	4	Clamper	10	△	VJR3		(428)	4	11. Tapping Screw (3 ^φ X10mm)	4	△	XTV3+10B	
150	4	Operation Panel Angle	1	○	VMAS0102		165	4	12. Switch Cover	3	○	VGK0553	
151	4	Right Side Frame	1	○	VMKS0012		166	4	13. Grounding Metal	1	○	VMAS0126	
152	4	Left Side Frame	1	○	VMKS0006		167	4	14. Operation Board Barrier	1	○	VXFS0002	
153	4	Plastic Edge	2	○	VMES0006		168	4	15. Play Arm Spring	1	○	VMB0399	
(241)	4	Barrier	4	△	VMZS0017		169	4	16. Lug	1	○	VJT0015	
		BATTERY SOCKET UNIT					170	4	Jack Panel Unit	1	○	VYFS0004	
		CONSIST OF					(165)	4	Switch Cover	1	△	VGK0553	
154	4	1. Battery Socket	1	○	VJJS0008		171	4	Slide Angle Spring	1	○	VMBS0016	
155	4	2. Battery Socket Angle	1	○	VMAS0101		(E)	4	Head Amp C.B.A. Unit	1	△	VEPS0501B1	
(426)	4	3. Tapping Screw (3 ^φ X8mm)	2	△	XTV3+8JFX		(E)	4	Audio C.B.A. Unit	1	△	VEPS1010A1	
							(E)	4	AVR P.C.B. Unit	1	△	VEPS0105A1	
							172	4	Heat Sink	1	○	VSCS0006	
(E)	4	Fuse C.B.A.	1	△	VEPS0027A1		173	4	Transistor Holder Spring	1	○	TES7151	
156	4	Fuse Board Angle	1	○	VMAS0103		(E)	4	RF Converter Hold Spring	1	△	VEQS0012	

Item No.	Drawing No.	Description	Pcs/ Set	Availa- bility	Part No.	Remark	Item No.	Drawing No.	Description	Pcs/ Set	Availa- bility	Part No.	Remark
174	4	Converter Hold Spring	1	○	VMBS0035				CASSETTE COVER UNIT				
175	4	Fuse Label A	1	○	VQLS0025				CONSIST OF				
176	4	Caution Label	1	○	VQLS0046		194	5	1. Cassette cover	1	○	VYPS0248	
(232)	4	Counter Spacer	1	△	VMZS0030		195	5	2. Mis-Insertion Protector	1	○	VGQS0019	
177	4	F Connector Washer	1	○	VNWS0001		196	5	3. Return Spring	1	○	VMBS0034	
(E)	4	18 Pin Jack Unit	1	△	VEKS0217		197	5	4. Cassette Up Caution	1	○	VQLS0027	
(243)	4	Capstan Guard	1	△	VMAS0305				Label				
178	4	Tracking Knob	1	○	VGTS0008		(244)	5	5. Cassette Holder Rubber	2	△	VMGS0007	
179	4	Jack Mount Angle	1	○	VMAS0099								
(230)	4	Belt Cover	1	△	VMAS0135		198	5	Bottom Case Unit	1	○	VYPS0044	
							199	5	Battery Cover	1	○	VKUS0009	
							200	5	Rubber Cushion B	2	○	VKAS0002	
		FRONT PANEL UNIT					201	5	Bottom Case Label	1	○	VQLS0030	
		CONSIST OF					202	5	Battery Jack Label	1	○	VQLS0023	
180	5	1. Front Panel	1	○	VYPS0038		203	5	Battery Ribbon	1	○	VMWS0001	
181	5	2. Shoulder Belt Lock	2	○	VXUS0004		204	5	Battery Caution Label	1	○	VQLS0135	
182	5	3. Handle Support Angle	1	○	VXAS0040		205	5	Battery Cushion	3	○	VMTS0006	
183	5	4. Handle Cover A	1	○	VKHS0001								
184	5	5. Handle Angle A	1	○	VMAS0075								
185	5	6. Handle Connector	2	○	VMSS0065		206	6	Packing Case	1	○	VPGS0140	
(433)	5	7. Tapping Screw (3 ϕ X10mm)	2	△	XTS3+10BZ		207	6	Top Cushion (Deck)	1	○	VPNS0010	
186	5	8. Handle Cover B	1	○	VKHS0003		208	6	Top Cushion (Tuner)	1	○	VPNS0011	
187	5	9. Handle Holder	2	○	VMDS0009		209	6	Bottom Cushion (Deck)	1	○	VPNS0012	
(434)	5	10. Screw (4 ϕ X8mm)	2	△	XSN4+8FX		210	6	Bottom Cushion (Tuner)	1	○	VPNS0013	
(238)	5	11. Handle Angle B	1	△	VMAS0134		211	6	Polyethylene Bag (Deck)	1	○	VPFS0002	
							212	6	Polyethylene Bag (Tuner)	1	○	VPFS0003	
188	5	Jack Cover	1	○	VYFS0008		213	6	Accessory Case	1	○	VPNS0014	
189	5	Top Panel Unit	1	○	VYPS0042		214	6	Remote Pause Switch	1	○	NV-A182	
190	5	Converter Channel Label	1	○	VGNS0018		215	6	Battery Pack	1	○	LCR-3012	
191	5	Rubber Cushion A	2	○	VKAS0001		216	6	Cassette Tape	1	○	NV-T60-P	
192	5	Jack Cover Holder	1	○	VMES0004		217	6	Twin Lead Connector	2	○	VJA0102	
193	5	Caution Label	1	○	VQLS0024		218	6	Coaxial Connector Cable	1	○	VJA0103	
(231)	5	Rubber Cushion C	2	△	VKAS0003		219	6	Matching Box	1	○	VSQ0015	
							220	6	VHF Antenna Adaptor	1	○	VSQ0057	
							221	6	F Connector	1	○	VSQ0051	

Item No.	Drawing No.	Description	Pcs/Set	Availability	Part No.	Remark	Item No.	Drawing No.	Description	Pcs/Set	Availability	Part No.	Remark
222	6	300 OHM Connection Board	1	○	VJH0091		401	1,2,3,4	Tapping Screw (3 ϕ X8mm)	39	○	XTV3+8FFXS	
223	6	Fan Bag Kit	1	○	VQFS0050		402	2,3,4	Tapping Screw (3 ϕ X6mm)	13	○	XTV3+6FFXS	
224	6	Shoulder Belt	1	○	VYCS0005		403	2,3	Screw With Washer (3 ϕ X6mm)	6	○	XYN3+F6FXS	
225	6	Side Protection Pad	1	○	VPGS0037		404	3	Tapping Screw (3 ϕ X8mm)	1	○	XTV3+8BFX	
226	2	Spacer	2	○	VMX0204		405	2,3	Screw (3 ϕ X4mm)	7	○	XSN3+4FXS	
							406	3	Tapping Screw (3 ϕ X6mm)	2	○	XTN3+6GFY	
228	3	Lock Lever B	1	○	VMLS0015		407	3	Tapping Screw (4 ϕ X20mm)	1	○	XTN4+20AFX	
229	1	Static Discharge Brush Unit	1	○	VXA0963		408	3	Tapping Screw (3 ϕ X10mm)	1	○	XTV3+10FFXS	
230	4	Belt Cover	1	○	VMAS0135								
231	5	Rubber Cushion C	2	○	VKAS0003		410	2,3	Tapping Screw (2 ϕ X10mm)	1	○	XYN2+C10FXS	
232	4	Counter Spacer	1	○	VMZS0030		411	2	Tapping Screw (3 ϕ X8mm)	3	○	XSN3+8FXS	
							412	2	Screw (3 ϕ X12mm)	2	○	XSN3+12FXS	
							413	1	Screw (2 ϕ X6mm)	2	○	XYN2+C6FXS	
							414	1,2,4	Screw With Washer (3 ϕ X8mm)	11	○	XYN3+F8FXS	
							415	2	Screw (2 ϕ X4mm)	1	○	XSN2+4FXS	
							416	2	Tapping Screw (2 ϕ X8mm)	1	○	XTN2+8JFX	
238	5	Handle Angle B	1	○	VMAS0134		417	2	Tapping Screw (3 ϕ X12mm)	2	○	XTV3+12FFXS	
							418	1	Screw (3 ϕ X10mm)	2	○	XYN3+B10BWS	
240	1	Adjust Plate	1	○	VMAS0304		419	1	Screw With Washer (3 ϕ X12mm)	3	○	XYN3+C12FXS	
241	4	Barrier	4	○	VMZS0017		420	1	Tapping Screw (3 ϕ X15mm)	2	○	XTV3+15FFXS	
							421	1	Screw (3 ϕ X15mm)	3	○	XSN3+15FXS	
243	4	Capstan Guard	1	○	VMAS0305								
244	5	Cassette Holder Rubber	2	○	VMGS0007		422	3	2 Point Hex. Screw (3 ϕ X4mm)	2	○	XXE3D4FXKS	
245	6	Ear Phone	1	○	VBES0001		423	3	Screw With Washer (3 ϕ X4mm)	2	○	XYN3+C4FXS	
							424	4	Tapping Screw (3 ϕ X6mm)	21	○	XTV3+6JFX	
							425	4	Tapping Screw (3 ϕ X6mm)	12	○	XTB3+6FFXS	
248	4	Spacer	1	○	VMXS0008		426	4	Tapping Screw (3 ϕ X8mm)	9	○	XTV3+8JFX	
							427	4	Tapping Screw (2.6 ϕ X10mm)	3	○	XTN26+10B	
							428	4	Tapping Screw (3 ϕ X10mm)	4	○	XTV3+10B	
							429	4	Tapping Screw (3 ϕ X8mm)	8	○	XTV3+8JFXR	
							430	4	Screw (3 ϕ X6mm)	1	○	XSB3+6FXR	
							431	4	Tapping Screw (3 ϕ X10mm)	5	○	XTV3+10JFX	
							433	5	Tapping Screw (3 ϕ X10mm)	2	○	XTS3+10BZ	
							434	5	Screw (4 ϕ X8mm)	2	○	XSN4+8FX	

[illegible]

[illegible]

ELECTRICAL REPLACEMENT PARTS LIST

MODEL NO. PV-2600

Note: 1. Be sure to make your orders of replacement parts according to this list.

2. IMPORTANT SAFETY NOTICE

Components identified by shade have special characteristics for safety.

When replacing any these components, use only the original ones.

3. Unless otherwise specified;

All resistors are in OHMS, 1/8W, $\pm 5\%$ carbon, K=1,000 ohms, M=1,000 K ohms.

All capacitors are in MICROFARADS, $\pm 10\%$, except electrolytic $+30\%$ -10% ; P= μ F

All coils are in MICROHENRIES, m=1,000 μ .

4. C.B.A; Circuit Board Assembly.

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
	VEPS0303A1	VIDEO PROCESS C.B.A.		
	VEPS0204A1	SERVO C.B.A.		
	VEPS0205A	SUB-SERVO C.B.A.		
	VEPS0601A1	SYSTEM CONTROL C.B.A.		
	VEPS0502B1	HEAD AMP C.B.A.		
	VEPS0105A1	AVR C.B.A.		
	VEPS0402A1	AUDIO C.B.A.		
	VEPS0404A	SUB-AUDIO C.B.A.		
	VEPS0001A	KEY BOARD C.B.A.		
	VEPS0026A1	PRESSURE SOLENOID		
		OPERATION C.B.A.		
	VEPS0027A1	FUSE C.B.A.		
	VEPS0005A1	LOADING/UNLOADING		
		COMPLETION SWITCH C.B.A.		
	VEPS0015A	F.F. MICRO SWITCH C.B.A.		
	VEPS0006A1	SENSOR LAMP C.B.A.		
	VEPS0007A	REEL SENSOR C.B.A.		
	VEPS0061A1	SWITCH C.B.A. UNIT		
	VEKS0213	INPUT SELECTOR C.B.A.		
	VEKS0217	18P CONNECTOR C.B.A.		

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
		VIDEO PROCESS C.B.A.		
		-Luminance Process Section-		
		ICs		
IC301	AN6300		1	
IC303	AN6331		1	
IC304	AN304		1	
IC305	SA8071		1	
		Transistors		
Q301	2SB641 (Q,R)		1	
Q302-304	2SD636 (Q,R)		3	
Q305	2SB641 (Q,R)		1	
Q306-308	2SD636 (Q,R)		3	
Q316-318	2SD636 (Q,R)		3	
Q319	2SB641 (Q,R)		1	
Q320	2SD636 (Q,R)		1	
Q322,323	2SD636 (Q,R)		2	
Q327,238	2SD636 (Q,R)		2	
Q329,330	2SC2377 (C,D)		2	
Q331-333	2SD636 (Q,R)		3	
Q334	2SD778 (Q,R)		1	
Q335	2SB641 (Q,R)		1	
Q336,337	2SD778 (Q,R)		2	
Q338-347	2SD636 (Q,R)		10	
Q350-354	2SD636 (Q,R)		5	
		Diodes		
D303	MA150		1	
D304,305	1SS16		2	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks	Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
D306,307	MA150		2		R320	ERD25TJ681	1/4W 680	1	
D308	0A90G		1		R321	ERD10TJ272	2.7K	1	
D310	ISS16		1		R322	ERD25TJ911	1/4W 910	1	
D312	ISS16		1		R323-325	ERD10TJ153	15K	3	
D315	MA150		1		R326	ERD25TJ561	1/4W 560	1	
D316-319	ISS16		4		R327	ERD10TJ222	2.2K	1	
D321,322	MA150		2		R328	ERD10TJ102	1K	1	
D325-327	MA150		3		R329	ERD25TJ391	1/4W 390	1	
D330	MA150		1		R330	ERD10TJ222	2.2K	1	
D331	RD9.1EB		1		R331	ERD10TJ272	2.7K	1	
D332,333	MA150		2		R332	ERD10TJ103	10K	1	
D325-327	MA150		3		R333	EVNK6AA00B53	Variable 5K	1	
D330	MA150		1		R334	ERD10TJ222	2.2K	1	
D331	RD9.1EB		1		R335	ERD10TJ332	3.3K	1	
D332,333	MA150		2		R336	EVNK6AA00B53	Variable 5K	1	
D334	MA150		1		R337	ERD10TJ123	12K	1	
					R338	ERD10TJ223	22K	1	
					R339,340	ERD10TJ103	10K	2	
					R341	ERD25TJ154	1/4W 150K	1	
					R342	ERD25TJ823	1/4W 82K	1	
					R343	ERD25TJ224	1/4W 220K	1	
					R344	EVNK6AA00B14	Variable 10K	1	
					R345,346	ERD25TJ823	1/4W 82K	2	
					R347	ERD10TJ332	3.3K	1	
					R348	ERD10TJ103	10K	1	
					R349	EVNK6AA00B52	Variable 500	1	
					R350	ERD25TJ820	1/4W 82	1	
					R351,352	ERD25TJ561	1/4W 560	2	
					R353	ERD10TJ223	22K	1	
					R354	ERD10TJ103	10K	1	
					R355	ERD10TJ222	2.2K	1	
					R356	ERD10TJ393	39K	1	
					R357	ERD10TJ103	10K	1	
					R358,359	ERD10TJ102	1K	2	
					R398	ERD10TJ822	8.2K	1	
R302	ERD10TJ152	1.5K	1						
R303	ERD10TJ102	1K	1						
R304	ERD25TJ124	1/4W 120K	1						
R306	ERD10TJ122	1.2K	1						
R307	ERD10TJ102	1K	1						
R309	ERD10TJ332	3.3K	1						
R310	ERD25TJ911	1/4W 910	1						
R311	ERD10TJ392	3.9K	1						
R312,313	ERD10TJ103	10K	2						
R314	ERD10TJ122	1.2K	1						
R315	EVNK6AA00B53	Variable 5K	1						
R316	ERD10TJ182	1.8K	1						
R317	ERD10TJ472	4.7K	1						
R318	ERD25TJ821	1/4W 820	1						
R319	ERD10TJ182	1.8K	1						

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks	Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
R399	ERD10TJ152	1.5K	1		R3143	ERD10TJ682	6.8K	1	
R3100	ERD10TJ102	1K	1		R3147	ERD10TJ153	15K	1	
R3101,3102	ERD25TJ151	1/4W 150	2		R3148	ERD25TJ561	1/4W 560	1	
R3103,3104	ERD25TJ331	1/4W 330	2		R3149	ERD25TJ681	1/4W 680	1	
R3105	ERD10TJ102	1K	1		R3150	ERD25TJ474	1/4W 470K	1	
R3106	ERD10TJ222	2.2K	1		R3154	ERD25TJ471	1/4W 470	1	
R3107	ERD10TJ102	1K	1		R3155	ERD10TJ102	1K	1	
R3109	ERD25TJ821	1/4W 820	1		R3161	ERD10TJ152	1.5K	1	
R3110,3111	ERD25TJ391	1/4W 390	2		R3162	ERD10TJ102	1K	1	
R3112	ERD10TJ102	1K	1		R3163	ERD10TJ273	27K	1	
R3113	EVNK6AA00B54	Variable 50K	1		R3164	ERD10TJ123	12K	1	
R3114	ERD10TJ153	15K	1		R3166	ERD10TJ102	1K	1	
R3115	ERD25TJ821	1/4W 820	1		R3167	ERD25TJ821	1/4W 820	1	
R3116	ERD25TJ331	1/4W 330	1		R3168	ERD25TJ392	1/4W 3.9K	1	
R3117	ERD10TJ182	1.8K	1		R3169	ERD25TJ822	1/4W 8.2K	1	
R3118	EVNK6AA00B23	Variable 2K	1		R3171	ERD10TJ102	1K	1	
R3119	ERD10TJ122	1.2K	1		R3173	ERD10TJ473	47K	1	
R3122	ERD10TJ153	15K	1		R3174	ERD25TJ471	1/4W 470	1	
R3123	ERD25TJ105	1/4W 1M	1		R3175	ERD10TJ562	5.6K	1	
R3125	ERD10TJ223	22K	1		R3176	ERD10TJ122	1.2K	1	
R3126	ERD25TJ221	1/4W 220	1		R3177	ERD10TJ102	1K	1	
R3127	ERD10TJ122	1.2K	1		R3178	ERD10TJ473	47K	1	
R3128	ERD10TJ152	1.5K	1		R3179	ERD25TJ121	1/4W 120	1	
R3129	ERDTJ102	1K	1		R3180	ERD10TJ562	5.6K	1	
R3131	ERD10TJ562	5.6K	1		R3183	ERD10TJ103	10K	1	
R3132	ERD10TJ472	4.7K	1		R3184	ERD10TJ562	5.6K	1	
R3133	ERD25TJ101	1/4W 100	1		R3187	ERD25TJ181	1/4W 180	1	
R3134	ERD10TJ102	1K	1		R3188	EVNK6AA00B13	Variable 1K	1	
R3135	ERD25TJ681	1/4W 680	1		R3189,3190	ERD10TJ392	3.9K	2	
R3136	ERD25TJ561	1/4W 560	1		R3191	ERD10TJ102	1K	1	
R3137	ERD10TJ222	2.2K	1		R3192	ERD25TJ121	1/4W 120	1	
R3138	ERD25TJ561	1/4W 560	1		R3193	ERD25TJ271	1/4W 270	1	
R3139	ERD10TJ182	1.8K	1		R3194	ERD25TJ821	1/4W 820	1	
R3140	ERD10TJ473	47K	1		R3195,3196	ERD25TJ331	1/4W 330	2	
R3142	ERD10TJ102	1K	1		R3200	ERD25TJ471	1/4W 470	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks	Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
R3201	ERD10TJ273	27K	1		R3242	ERD10TJ102	1K	1	
R3202	ERD10TJ183	18K	1		R3243	ERD10TJ562	5.6K	1	
R3203	ERD25TJ271	1/4W 270	1		R3244	ERD10TJ333	33K	1	
R3204	ERD25TJ331	1/4W 330	1		R3245	ERD10TJ272	2.7K	1	
R3205	ERD25TJ271	1/4W 270	1		R3246	ERD25TJ821	1/4W 820	1	
R3206	ERD10TJ222	2.2K	1		R3247	ERD25TJ101	1/4W 100	1	
R3207	ERD25TJ331	1/4W 330	1		R3248	ERD10TJ222	2.2K	1	
R3208	ERD10TJ102	1K	1		R3249	ERD10TJ333	33K	1	
R3209	ERD25TJ821	1/4W 820	1		R3251	ERD10TJ473	47K	1	
R3210	ERD25TJ121	1/4W 120	1		R3253	ERD25TJ103	10K	1	
R3211	ERD25TJ330	1/4W 33	1		R3254	ERD10TJ333	33K	1	
R3212	ERD10TJ102	1K	1		R3255	ERD25TJ224	1/4W 220K	1	
R3213	ERD25TJ681	1/4W 680	1		R3258	ERD25TJ101	1/4W 100	1	
R3214	ERD10TJ333	33K	1		R3259	ERD10TJ152	1.5K	1	
R3215	ERD10TJ103	10K	1		R3260	ERD25TJ271	1/4W 270	1	
R3217	ERD10TJ102	1K	1		R3261	ERD10TJ332	3.3K	1	
R3218	ERD25TJ221	1/4W 220	1		R3262	ERD25TJ470	1/4W 47	1	
R3219	ERD10TJ561	560	1		R3263	ERD25TJ680	1/4W 68	1	
R3220	ERD25TJ821	1/4W 820	1		R3265	ERD10TJ332	3.3K	1	
R3221	ERD25TJ221	1/4W 220	1		R3270	ERD10TJ333	33K	1	
R3222	EVNK6AA00B15	Variable 100K	1		R3272	ERD10TJ103	10K	1	
R3223	ERD25TJ561	1/4W 560	1		R3273	ERD25TJ680	1/4W 68	1	
R3226	ERD25TJ102	1/4W 1K	1		R3301,3302	ERD10TJ103	10K	2	
R3227	ERD10TJ682	6.8K	1		R3303	ERD10TJ473	47K	1	
R3229,3230	ERD10TJ333	33K	2		R3304	ERD10TJ103	10K	1	
R3231,3232	ERD10TJ103	10K	2		R3305	ERD25TJ101	1/4W 100	1	
R3233	ERD10TJ562	5.6K	1		R3306,3307	ERD10TJ473	47K	2	
R3234	ERD10TJ333	33K	1		R3308	ERD25TJ820	1/4W 82	1	
R3235	ERD10TJ272	2.7K	1		R3309,3310	ERD10TJ223	22K	2	
R3236	ERD10TJ682	6.8K	1		R3311	ERD10TJ562	5.6K	1	
R3237	ERD10TJ182	1.8K	1		R3312	ERD10TJ393	39K	1	
R3238	ERD10TJ152	1.5K	1		R3313	ERD10TJ102	1K	1	
R3239	ERD25TJ681	1/4W 680	1		R3314	ERD25TJ331	1/4W 330	1	
R3240	ERD10TJ333	33K	1		R3315	ERD25TJ331	1/4W 330	1	
R3241	ERD10TJ392	3.9K	1		R3316	ERD10TJ472	4.7K	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks	Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
R3317	ERD25TJ750	1/4W 75	1		C322	ECEA1CS470	Electrolytic 16V 47	1	
R3318	ERD10TJ102	1K	1		C323	ECKWIH103PF	Ceramic 50V 0.01	1	
R3319	ERD10TJ562	5.6K	1		C324	ECVIZW50X44	Trimmer 1W 50P	1	
R3320	ERD25TJ271	1/4W 270	1		C326	ECEA0JS101	Electrolytic 6V 100	1	
R3321,3322	ERD10TJ333	33K	2		C327	ECKWIH103PF	Ceramic 50V 0.01	1	
R3323	ERD25TJ471	1/4W 470	1		C328	ECCWIH820JC	Ceramic 50V 82P	1	
R3324	ERD25TJ391	1/4W 390	1		C329,330	ECKRIH103PF	Ceramic 50V 0.01	2	
R3325	ERD10TJ103	10K	1		C331	ECKWIH331KB	Ceramic 50V 330P	1	
R3326	ERD25TJ561	1/4W 560	1		C332	ECCWIH680KC	Ceramic 50V 68P	1	
R3327	ERD25TJ392	1/4W 3.9K	1		C334	ECQMIH102KZ	Mylar 50V 0.001	1	
R3400	ERD25TJ102	1/4W 1K	1		C335	ECQMIH333KZ	Mylar 50V 0.033	1	
					C336	ECCWIH470KC	Ceramic 50V 47P	1	
					C341	ECEA1CS470	Electrolytic 16V 47	1	
					C364	ECCWIH680JC	Ceramic 50V 68P	1	
					C365	ECEA1CS100	Electrolytic 16V 10	1	
					C366	ECKCIH431JS	Ceramic 50V 430P	1	
		Capacitors			C367	ECCWIH560KC	Ceramic 50V 56P	1	
C301	ECEA1CS220	Electrolytic 16V 22	1		C368-370	ECKWIH103PF	Ceramic 50V 0.01	3	
C302,303	ECEA6N47Z	Electrolytic N 6V 47	2		C371	ECEA0JS470	Electrolytic 6V 47	1	
C304	ECEA50ZR1	Electrolytic 50V 0.1	1		C372	ECKWIH103PF	Ceramic 50V 0.01	1	
C305	VCY25473M	Semiconductor 25V 0.0047	1		C373	ECCWIH101KC	Ceramic 50V 100P	1	
C306	ECQMIH333KZ	Mylar 50V 0.033	1		C374	ECQMIH102KZ	Mylar 50V 0.001	1	
C307	ECEA1AS221	Electrolytic 10V 220	1		C375	ECCWIH220KC	Ceramic 50V 22P	1	
C308	ECCWIH101KC	Ceramic 50V 100P	1		C376	ECKWIH103PF	Ceramic 50V 0.01	1	
C309	ECEA0JS470	Electrolytic 6V 47	1		C377	ECCWIH680KC	Ceramic 50V 68P	1	
C310	ECQMIH472KZ	Mylar 50V 0.0047	1		C380	VCKCIH431JS	Ceramic 50V 430P	1	
C312	ECEA0JS470	Electrolytic 6V 47	1		C381	ECKCIH681JS	Ceramic 50V 680P	1	
C313	VCKTIH271KB	Ceramic 50V 270P	1		C382	ECKCIH561JS	Ceramic 50V 560P	1	
C314	ECKWIH471KB	Ceramic 50V 470P	1		C383	ECEA1CS101	Electrolytic 16V 100	1	
C315	ECCWIH270KC	Ceramic 50V 27P	1		C384	ECEA1CS470	Electrolytic 16V 47	1	
C316	ECEA1HS010	Electrolytic 50V 1	1		C385	ECCWIH181JC	Ceramic 50V 180P	1	
C318	ECEA1CS221	Electrolytic 16V 220	1		C386	ECEA1CS100	Electrolytic 16V 10	1	
C319	ECEA1SH010	Electrolytic 50V 1	1		C387	ECCWIH680KC	Ceramic 50V 68P	1	
C320	ECEA1CS470	Electrolytic 16V 47	1		C388	ECEA1CS470	Electrolytic 16V 47	1	
C321	ECKWIH103PF	Ceramic 50V 0.01	1		C389	ECEA0JS470	Electrolytic 6V 47	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks	Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
C391	ECCW1H820KC	Ceramic 50V 82P	1		C3150	ECEA1CS470	Electrolytic 16V 47	1	
C392	ECEA0JS470	Electrolytic 6V 47	1		C3151	ECKW1H103PF	Ceramic 50V 0.01	1	
C393	ECEA1CS100	Electrolytic 16V 10	1		C3152	ECCW1H820JC	Ceramic 50V 828	1	
C394	VCKT1E103NK	Ceramic 25V 0.01	1		C3153,3154	VCKT1E103NX	Ceramic 25V 0.01	2	
C395	ECEA1AS470	Electrolytic 10V 47	1		C3155	ECCW1H680KC	Ceramic 50V 68P	1	
C396	ECEA1HS010	Electrolytic 50V 1	1		C3156	ECCW1H121JC	Ceramic 50V 120P	1	
C397	ECKW1H103PF	Ceramic 50V 0.01	1		C3157	ECCW1H821J	Ceramic 50V 820P	1	
C398	VCCT1H470J	Ceramic 50V 47P	1		C3158	ECKW1H103PF	Ceramic 50V 0.01	1	
C3100	ECKW1H102PF	Ceramic 50V 0.001	1		C3159	ECEA1CS470	Electrolytic 16V 47	1	
C3105,3106	ECKW1H103PF	Ceramic 50V 0.01	2		C3160	ECKW1H331KB	Ceramic 50V 330P	1	
C3107	ECKW1H681KB	Ceramic 50V 680P	1		C3161	ECCW1H120KC	Ceramic 50V 12P	1	
C3108	ECKW1H102PF	Ceramic 50V 0.001	1		C3162	ECEA1AS101	Electrolytic 10V 100	1	
C3109	ECCW1H820JC	Ceramic 50V 82P	1		C3164	ECCW1H270KC	Ceramic 50V 27P	1	
C3110	ECQM1H104KZ	Mylar 50V 0.1	1		C3165	ECCW1H330KC	Ceramic 50V 33P	1	
C3111	ECKW1H103PF	Ceramic 59V 0.01	1		C3166	VCKT1H331KB	Ceramic 50V 330P	1	
C3113	ECEA1CS100	Electrolytic 16V 10	1		C3167	ECCW1H330KC	Ceramic 50V 33P	1	
C3114	ECKW1H103PF	Ceramic 50V 0.01	1		C3168	ECQM1H563KZ	Mylar 50V 0.056	1	
C3115	VCY25473M	Semiconductor 25V 0.0047	1		C3170	ECEA1CS470	Electrolytic 16V 47	1	
C3116	ECCW1H151JC	Ceramic 50V 150P	1		C3173,3174	ECCW1H470KC	Ceramic 50V 47P	2	
C3117	ECCW1H330KC	Ceramic 50V 33P	1		C3175,3176	ECKW1H103PF	Ceramic 50V 0.01	2	
C3118	ECCW1H390KC	Ceramic 50V 39P	1		C3177	ECCW1H040C	Ceramic 50V 4P	1	
C3123	ECCW1H101KC	Ceramic 50V 100P	1		C3183	ECEA1CS100	Electrolytic 16V 10	1	
C3125	ECKW1H103PF	Ceramic 50V 0.01	1		C3192	ECEA1AS101	Electrolytic 10V 100	1	
C3126	VCY25473M	Semiconductor 25V 0.0047	1		C3196	ECEA1CS470	Electrolytic 16V 47	1	
C3127	ECCW1H820JC	Ceramic 50V 82P	1		C3197	ECEA1AS101	Electrolytic 10V 100	1	
C3128	VCKC1H561JS	Ceramic 50V 560P	1		C3198	ECEA1AS221	Electrolytic 10V 220	1	
C3129	ECEA1JS470	Electrolytic 6V 47	1		C3199	ECEA16N22	Electrolytic N 16V 22	1	
C3130	ECEA1CS470	Electrolytic 16V 47	1		C3200	ECEA1CS470	Electrolytic 16V 47	1	
C3131	ECKW1H331KB	Ceramic 50V 330P	1		C3212	ECEA1CS470	Electrolytic 16V 47	1	
C3133	ECCW1H101KC	Ceramic 50V 100P	1		C3203	ECEA1CS100	Electrolytic 16V 10	1	
C3140	ECKW1H103PF	Ceramic 50V 0.01	1		C3181,3182	VCY25473M	Semiconductor 25V 0.0047	2	
C3141	ECCW1H330KC	Ceramic 50V 33P	1		C3184	ECEA1CS470	Electrolytic 16V 47	1	
C3142,3143	ECCW1H180KC	Ceramic 50V 18P	2						
C3144,3145	ECKW1H103PF	Ceramic 50V 0.01	2						
C3147-3149	ECKW1H103PF	Ceramic 50V 0.01	3						

[illegible]

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks	Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
		-Chrominance Process							
		Section-							
		ICs							
IC801	AN305		1		R802	ERD25TJ474	1/4W 470K	1	
IC802	AN337		1		R803	ERD10TJ103	10K	1	
IC803	MN6061A		1		R804	ERD10TJ102	1K	1	
IC804	AN236		1		R805	ERD25TJ334	1/4W 330K	1	
IC805	AN6342		1		R806	ERD10TJ682	6.8K	1	
					R807	EVNK6AA00B14	Variable 10K	1	
					R808	EVNK6AA00B23	Variable 2K	1	
					R809	ERD10TJ183	18K	1	
					R810	ERD10TJ122	1.2K	1	
					R811,812	ERD10TJ102	1K	2	
					R813	ERD25TJ561	1/4W 560	1	
					R814	ERD10TJ102	1K	1	
		Transistors			R815	ERD10TJ152	1.5K	1	
Q801-804	2SD636 (Q,R)		4		R816,817	ERD10TJ273	27K	2	
Q805	2SC2377 (C,D)		1		R818	ERD10TJ332	3.3K	1	
Q806-809	2SD636 (Q,R)		4		R819	ERD10TJ333	33K	1	
Q811-815	2SD636 (Q,R)		5		R820	ERD10TJ123	12K	1	
Q816,817	2SB641 (Q,R)		2		R821	ERD25TJ471	1/4W 470	1	
Q818	2SD636 (Q,R)		1		R822	ERD10TJ392	3.9K	1	
Q823-830	2SD636 (Q,R)		8		R823	ERD25TJ181	1/4W 180	1	
Q832	2SD636 (Q,R)		1		R824	ERD25TJ221	1/4W 220	1	
Q833	2SD638 (Q,R)		1		R825	ERD10TJ272	2.7K	1	
					R826	ERD10TJ562	5.6K	1	
					R827	ERD10TJ222	2.2K	1	
					R828	ERD10TJ102	1K	1	
		Diodes			R829	ERD10TJ393	39K	1	
D801,802	MA150		2		R830	ERD25TJ122	1/4W 1.2K	1	
D803	0A90 G		1		R831	ERD10TJ822	8.2K	1	
D804-807	MA150		4		R832	ERD25TJ221	1/4W 220	1	
D809	MA150		1		R833	ERD10TJ222	2.2K	1	
D812,813	MA150		2		R834	ERD10TJ562	5.6K	1	
					R835	ERD10TJ223	22K	1	
					R836	ERD10TJ333	33K	1	
					R837	ERD10TJ123	12K	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks	Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
R838	ERD10TJ822	8.2K	1		R882	ERD10TJ472	4.7K	1	
R839	EVNK6AA00B53	Variable	5K	1	R884	ERD10TJ152	1.5K	1	
R840	EVNK6AA00B23	Variable	2K	1	R885	ERD25TJ471	1/4W 470	1	
R841-843	ERD25TJ391	1/4W 390	3		R886	ERD10TJ123	12K	1	
R845,846	ERD25TJ391	1/4W 390	2		R887	ERD10TJ103	10K	1	
R847	ERD25TJ681	1/4W 680	1		R888	ERD10TJ392	3.9K	1	
R848	ERD25TJ181	1/4W 180	1		R889	ERD10TJ562	5.6K	1	
R850	ERD10TJ153	15K	1		R890	ERD10TJ182	1.8K	1	
R853	ERD25TJ121	1/4W 120	1		R891	ERD10TJ392	3.9K	1	
R854	ERD25TJ271	1/4W 270	1		R892	EVNK6AA00B54	Variable 50K	1	
R855	ERD25TJ101	1/4W 100	1		R893	ERD10TJ103	10K	1	
R856	ERD10TJ562	5.6K	1		R894	ERD10TJ682	6.8K	1	
R857	ERD10TJ153	15K	1		R895	ERD25TJ181	1/4W 180	1	
R858	ERD10TJ333	33K	1		R896	ERD10TJ682	6.8K	1	
R859	ERD10TJ222	2.2K	1		R897	ERD10TJ152	1.5K	1	
R860	EVNK6AA00B54	Variable 50K	1		R898	ERD10TJ102	1K	1	
R861	ERD10TJ392	3.9K	1		R899	ERD10TJ563	56K	1	
R862	ERD10TJ822	8.2K	1		R8100	ERD10TJ152	1.5K	1	
R863	ERD10TJ183	18K	1		R8101	ERD10TJ392	3.9K	1	
R865,866	ERD10TJ102	1K	2		R8103	ERD10TJ272	2.7K	1	
R867	ERD10TJ332	3.3K	1		R8104	ERD25TJ270	1/4W 27	1	
R868	ERD10TJ152	1.5K	1		R8105	ERD25TJ331	1/4W 330	1	
R869	EVNK6AA00B13	Variable 1K	1		R8106	EVNK6AA00B53	Variable 5K	1	
R870	ERD10TJ222	2.2K	1		R8107	ERD25TJ151	1/4W 150	1	
R871	ERD25TJ564	1/4W 560K	1		R8108	ERD25TJ561	1/4W 560	1	
R872	ERD25TJ271	1/4W 270	1		R8109	ERD10TJ153	15K	1	
R873	ERD10TJ333	33K	1		R8110	ERD10TJ393	39K	1	
R874	ERD10TJ152	1.5K	1		R8111	ERD25TJ122	1/4W 1.2K	1	
R875	ERD25TJ271	1/4W 270	1		R8112	ERD10TJ562	5.6K	1	
R876	ERD10TJ562	5.6K	1		R8113	ERD10TJ102	1K	1	
R877	ERD10TJ393	39K	1		R8114	ERD10TJ122	1.2K	1	
R878	ERD10TJ123	12K	1		R8115	ERD10TJ103	10K	1	
R879	ERD25TJ101	1/4W 100	1		R8116	ERD10TJ223	22K	1	
R880	ERD10TJ153	15K	1		R8119	ERD10TJ182	1.8K	1	
R881	ERD10TJ473	47K	1		R8120	ERD10TJ103	10K	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks	Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
R8121	ERD25TJ561	1/4W 560	1		C810-813	ECKWIH103PF	Ceramic 50V 0.01	4	
R8201	ERD10TJ473	47K	1		C814	ECKWIH681KB	Ceramic 50V 680P	1	
R8202	ERD10TJ333	33K	1		C815-818	ECKWIH103PF	Ceramic 50V 0.01	4	
R8203	ERD10TJ473	47K	1		C819	ECEA1CS100	Electrolytic 16V 10	1	
R8204	ERD10TJ333	33K	1		C820	ECKWIH103PF	Ceramic 50V 0.01	1	
R8205	ERD25TJ683	1/4W 68K	1		C822	ECKWIH471KB	Ceramic 50V 470P	1	
R8206	ERD10TJ333	33K	1		C823	ECKWIH103PF	Ceramic 50V 0.01	1	
R8207	ERD10TJ223	22K	1		C824	ECEA1CS100	Electrolytic 16V 10	1	
R8208	ERD10TJ562	5.6K	1		C825	ECKWIH103PF	Ceramic 50V 0.01	1	
R8209,8210	ERD25TJ683	1/4W 68K	2		C826	ECQM1H223KZ	Mylar 50V 0.022	1	
R8211	ERD25TJ104	1/4W 100K	1		C827	VCY25473M	Semiconductor 25V 0.0047	1	
R8212	ERD10TJ562	5.6K	1		C828	ECKWIH391KB	Ceramic 50V 390P	1	
R8213	ERD10TJ472	4.7K	1		C830	ECEA1CS100	Electrolytic 16V 10	1	
R8214	ERD25TJ471	1/4W 470	1		C831	ECCWIH560KC	Ceramic 50V 56P	1	
R8215	ERD10TJ332	3.3K	1		C832,833	ECKWIH391KB	Ceramic 50V 390P	2	
R8216	ERD25TJ224	1/4W 220K	1		C834	ECEA1CS470	Electrolytic 16V 47	1	
R8217	EVNK6AA00B54	Variable 50K	1		C836	ECQM1H152KZ	Mylar 50V 0.0015	1	
R8218	ERD25TJ823	1/4W 82K	1		C837	ECQM1H103KZ	Mylar 50V 0.01	1	
R8219	ERD10TJ332	3.3K	1		C842	ECKWIH103PF	Ceramic 50V 0.01	1	
R8220	ERD10TJ472	4.7K	1		C843	ECEA1CS100	Electrolytic 16V 10	1	
R8221	ERD25TJ331	1/4W 330	1		C844	ECEA1ES4R7	Electrolytic 25V 4.7	1	
					C845	ECKWIH103PF	Ceramic 50V 0.01	1	
					C846	ECCWIH101JL	Ceramic 50V 100P	1	
					C847	ECCWIH101KC	Ceramic 50V 100P	1	
					C848	ECKWIH103PF	Ceramic 50V 0.01	1	
					C849	ECCA1CS100	Electrolytic 16V 10	1	
		Capacitors			C850	ECKWIH561JS	Ceramic 50V 560P	1	
C801	ECKWIH103PF	Ceramic 50V 0.01	1		C851	ECKWIH221KB	Ceramic 50V 220P	1	
C802	ECEA1CS100	Electrolytic 16V 10	1		C852	ECCWIH151KC	Ceramic 50V 150P	1	
C803,804	ECKWIH103PF	Ceramic 50V 0.012	2		C853	ECCWIH390KC	Ceramic 50V 39P	1	
C805	ECCRIH470KC	Ceramic 50V 47P	1		C854	ECKWIH103PF	Ceramic 50V 0.01	1	
C806	ECEA50ZR47	Electrolytic 50V 0.47	1		C855	ECEA1AS101E	Electrolytic 10V 100	1	
C807	ECEA1CS470	Electrolytic 16V 47	1		C856	ECEA0JS470	Electrolytic 6.3V 47	1	
C808	ECEA1CS100	Electrolytic 16V 10	1		C857	ECEA1CS100	Electrolytic 16V 10	1	
C809	ECCRIH470KC	Ceramic 50V 47P	1		C859	ECKWIH103PF	Ceramic 50V 0.01	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks	Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
C862	ECKWIH103PF	Ceramic 50V 0.01	1				Coils		
C863	ECEAICS100	Electrolytic 16V 10	1		L801	VLQ80F390K	39	1	
C864	ECKWIH103PF	Ceramic 50V 0.01	1		L802,803	VLQ80F151K	150	2	
C865	ECCWIH101KC	Ceramic 50V 100P	1		L804	VLQ80F220K	22	1	
C866	ECQMIH222KZ	Mylar 50V 0.0022	1		L805	VLQ02F682K	6.8K	1	
C867,868	ECKWIH103PF	Ceramic 50V 0.01	2		L806	VLQ80F151K	150	1	
C869	ECCWIH390KC	Ceramic 50V 39P	1		L807	VLQ80F221K	220	1	
C870	ECCTIH390JU	Ceramic 50V 39P	1		L808	VLQ80F3R9K	3.9	1	
C871	ECCTIH150JU	Ceramic 50V 15P	1		L809	VLQ80F330K	33	1	
C872	ECEAICS100	Electrolytic 16V 10	1		L810	VLQ80R100K	10	1	
C873	ECEAIES4R7	Electrolytic 25V 4.7	1		L811	VLQ80F151K	150	1	
C874	ECEA50ZR1	Electrolytic 50V 0.1	1		L812,813	VLQ80F101K	100	2	
C875	ECQMIH222KZ	Mylar 50V 0.0022	1		L820	VLQ80F101K	100	1	
C877	ECCWIH680KC	Ceramic 50V 68P	1						
C878	ECEA50ZR33	Electrolytic 50V 0.33	1						
C879	ECQMIH333KZ	Ceramic 50V 0.033	1						
C880	ECKWIH271KB	Ceramic 50V 270P	1				Filters		
C882	ECKWIH391KB	Ceramic 50V 390P	1		FL801	VLF6		1	
C885	ECCWIH101KC	Ceramic 50V 100P	1		FL802	VLF0066		1	
C886	ECCWIH150KC	Ceramic 50V 15P	1		FL803	VLF0067		1	
C887	ECV1ZW20X32	Trimmer 1W 20P	1						
C888	ECCWIH101KC	Ceramic 50V 100P	1						
C8201	ECQMIH223KZ	Mylar 50V 0.022	1						
C8202	ECEAHS010	Electrolytic 50V 1	1				Transformers		
C8203	ECQMIH393KZ	Mylar 50V 0.039	1		T801	E1K-10S588D		1	
C8204	ECQV05274JZ	Mylar 50V 0.027	1		T802	VLT0097		1	
C8205	ECEAICS470	Electrolytic 16V 47	1						
							Miscellaneous		
					DL801	EFDEN645B22A	Delay Line	1	
					TH801	ERTD2ZHL102S	Thermistor 1K	1	
					X802,803	VSX0060	Xtal Osc.	2	
					TP801-805,	TJE9810	Test Point	15	
					TP807-816				

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks	Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
		SERVO C.B.A.			Q233	2SB641 (Q,R)		1	
					Q234-238	2SD636 (Q,R)		5	
					Q239	2SB641 (Q,R)		1	
		ICs			Q240-242	2SD636 (Q,R)		3	
IC201	AN6344		1		Q243	2SB641 (Q,R)		1	
IC202	AN6811		1		Q244-248	2SD636 (Q,R)		5	
IC203	AN6341		1		Q249,250	2SB641 (Q,R)		2	
					Q251-253	2SD636 (Q,R)		3	
		Transistors							
Q205,206	2SB641 (Q,R)		2						
Q207	2SB745 (S,T)		1						
Q208	2SD636 (Q,R)		1				Diodes		
Q209	2SB641 (Q,R)		1		D201				
Q210	2SC2497 (Q,R)		1		D202-205	MA150		4	
Q211	2SB641 (Q,R)		1		D206-208	MA150DD		3	
Q212	2SC2497 (Q,R)		1		D209-214	MA150		6	
Q213	2SB641 (Q,R)		1		D215	VD1222		1	
Q214	2SC2497 (Q,R)		1		D216-232	MA150		17	
Q215	2SD646 (Q,R)		1		D237,238	MA150		2	
Q216	2SB642 (Q,R)		1						
Q217	2SD636 (Q,R)		1						
Q218	2SB641 (Q,R)		1						
Q219-221	2SD636 (Q,R)		3				Resistors		
Q222	2SB641 (Q,R)		1		R211	ERD10TJ332	3.3K	1	
Q223,224	2SD636 (Q,R)		2		R212	ERD25TJ334	1/4W 330K	1	
Q225	2SB643 (Q,R)		1		R213	ERD10TJ472	4.7K	1	
Q226	2SC1847V (Q,R)		1		R215	ERD10TJ562	5.6K	1	
Q227	2SD661 (S,T)		1		R217,218	ERD25TJ105T	1/4W 1M	2	
Q228	2SD636 (Q,R)		1		R219	ERD10TJ682	6.8K	1	
Q229	2SB774 (Q,R)		1		R220	EVNK6AA00B54	Variable 50K	1	
Q230	2SD661 (S,T)		1		R221	ERD10TJ682	6.8K	1	
Q231	2SB745 (S,T)		1		R222	EVNK6AA00B54	Variable 50K	1	
Q232	2SB641 (Q,R)		1		R223	ERD10TJ393	39K	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks	Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
R224	EVNK6AA00B15	Variable 100K	1		R259	ERD25TJ680	1/4W 68	1	
R225	ERD10TJ472	4.7K	1		R260	ERD10TJ332	3.3K	1	
R226	ERD10TJ562	5.6K	1		R261	ERD10TJ333	33K	1	
R227	ERD25TJ683	1/4W 68K	1		R262	ERD10TJ152	1.5K	1	
R228	ERD10TJ332	3.3K	1		R263	ERD25TJ471	1/4W 470	1	
R229	ERD25TJ154	1/4W 150K	1		R264	ERD10TJ152	1.5K	1	
R230	ERD25TJ683	1/4W 68K	1		R265	ERD10TJ273	27K	1	
R231	EVNK6AA00B24	Variable 20K	1		R266	ERD10TJ153	15K	1	
R232	ERD10TJ332	3.3K	1		R267	ERD25TJ561	1/4W 560	1	
R233	ERD25TJ271	1/4W 270	1		R268	ERD25TJ681	1/4W 680	1	
R234	ERD10TJ152	1.5K	1		R269	ERD10TJ332	3.3K	1	
R235	ERD25TJ104	1/4W 100K	1		R270	ERD25TJ683	1/4W 68K	1	
R236	ERD10TJ152	1.5K	1		R271	ERD10TJ333	33K	1	
R237	ERD10TJ272	2.7K	1		R272	ERD10TJ332	3.3K	1	
R238	ERD10TJ332	3.3K	1		R273	ERD10TJ392	3.9K	1	
R239	ERC14GK155	1.5M	1		R274	EVNK6AA00B53	Variable 5K	1	
R240	ERD10TJ562	5.6K	1		R275	ERD10TJ822	8.2K	1	
R241	ERD10TJ473	47K	1		R276	ERD25TJ151	1/4W 150	1	
R242	ERD10TJ822	8.2K	1		R277	ERD25TJ330	1/4W 33	1	
R243	ERD10TJ103	10K	1		R278	ERD25TJ104	1/4W 100K	1	
R244	ERD25TJ683	1/4W 68K	1		R279	ERD10TJ393	39K	1	
R245	ERD10TJ103	10K	1		R280	ERD10TJ562	5.6K	1	
R246	ERD10TJ223	22K	1		R281	ERD10TJ103	10K	1	
R247	ERD25TJ561	1/4W 560	1		R282	ERD25TJ474	1/4W 470K	1	
R248	ERD10TJ222	2.2K	1		R283	ERD10TJ473	47K	1	
R249	ERD10TJ392	3.9K	1		R284	ERD25TJ105	1/4W 1M	1	
R250	ERX12ANJR82P		1		R285	ERD10TJ222	2.2K	1	
R251	ERD10TJ223	22K	1		R286	ERD10TJ273	27K	1	
R252	ERD10TJ392	3.9K	1		R287	ERD25TJ561	1/4W 560	1	
R253	ERD25TJ680	1/4W 68	1		R288	ERD10TJ153	15K	1	
R254	ERD10TJ223	22K	1		R289	ERD25TJ474	1/4W 470K	1	
R255	ERD10TJ682	6.8K	1		R290	ERD10TJ103	10K	1	
R256	ERD25TJ680	1/4W 68	1		R291	EVNK6AA00B54	Variable 50K	1	
R257	ERD10TJ223	22K	1		R292	ERD10TJ102	1K	1	
R258	ERD10TJ682	6.8K	1		R293	ERD25TJ683	1/4W 68K	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks	Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
R294	ERD25TJ103	1/4W 10K	1		R2131	ERD10TJ333	33K	1	
R295	ERD10TJ223	22K	1		R2132	ERD10TJ473	47K	1	
R296	ERD25TJ154	1/4W 150K	1		R2133	ERD10TJ562	5.6K	1	
R297	ERD10TJ102	1K	1		R2134,2135	ERD10TJ153	15K	2	
R298	ERD25TJ105	1/4W 1M	1		R2168	ERD10TJ393	39K	1	
R299	ERD10TJ332	3.3K	1		R2169	ERD10TJ393	39K	1	
R2101,2102	ERD10TJ102	1K	2		R2170	ERD10TJ563	56K	1	
R2103	ERD25TJ154	1/4W 150K	1		R2171	EVNK6AA00B54	Variable 50K	1	
R2104	ERD10TJ473	47K	1		R2172	ERD10TJ473	47K	1	
R2105	ERD25TJ474	1/4W 470K	1		R2173	EVNK6AA00B54	Variable 50K	1	
R2106	ERD10TJ392	3.9K	1		R2174	ERD10TJ473	47K	1	
R2107	ERD10TJ332	3.3K	1		R2175	ERD25VJ333	1/4W 33K	1	
R2108	ERD10TJ182	1.8K	1		R2176	ERD25TJ104	1/4W 100K	1	
R2109	ERD10TJ103	10K	1		R2177	ERD25TJ154	1/4W 150K	1	
R2110	ERD10TJ822	8.2K	1		R2178,2179	ERD25TJ104	1/4W 100K	2	
R2111	ERD10TJ103	10K	1		R2180	ERD10TJ393	39K	1	
R2112	ERD10TJ223	22K	1		R2181	ERD10TJ563	56K	1	
R2113	ERD25TJ102	1/4W 1K	1		R2182	ERD10TJ223	22K	1	
R2114	ERD10TJ472	4.7K	1		R2183	ERD10TJ563	56K	1	
R2115	ERD25TJ223	1/4W 22K	1		R2184	ERD10TJ102	1K	1	
R2116	ERD10TJ152	1.5K	1		R2185	ERD10TJ223	22K	1	
R2117	ERD10TJ222	2.2K	1		R2186	ERD10TJ222	2.2K	1	
R2118	ERD10TJ152	1.5K	1		R2196	ERD25TJ332	1/4W 3.3K	1	
R2119	ERD12TJ471C	1/2W 470	1		R2197	EVNK6AA00B54	Variable 50K	1	
R2120	ERD25TJ471	1/4W 470	1						
R2121	ERD10TJ563	56K	1						
R2122	ERD25TJ121	1/4W 120	1						
R2123	ERQ14AJ2R2P	Fuseble 2.2	1						
R2124	ERD10TJ223	22K	1						
R2125	ERD25TJ154	1/4W 150K	1						
R2126	ERD10TJ562	5.6K	1				Capacitors		
R2127	ERD25TJ474	1/4W 470K	1		C205	ECEA50ZR1	Electrolytic 50V 0.1	1	
R2128	ERD10TJ222	2.2K	1		C206,207	ECEA1HS010	Electrolytic 50V 1	2	
R2129	ERD10TJ103	10K	1		C208,209	ECQM1H563KZ	Mylar 50V 0.056	2	
R2130	ERD25VJ474	1/4W 470K	1		C210	ECQM1H153KZ	Mylar 50V 0.015	1	
					C211	ECQM1H104KZ	Mylar 50V 0.1	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks	Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
C212	ECQM1H473KZ	Mylar 50V 0.047	1		C247	ECQM1H103KZ	Mylar 50V 0.01	1	
C213	ECEA1AS221	Electrolytic 10V 220	1		C248	ECEA1HS010	Electrolytic 50V 1	1	
C214	ECEA1HS010	Electrolytic 50V 1	1		C249	ECEA1CS100	Electrolytic 16V 10	1	
C215	ECEA50ZR22	Electrolytic 50V 0.22	1		C250	ECEA50ZR33	Electrolytic 50V 0.33	1	
C216	ECEA1CS221	Electrolytic 16V 220	1		C251	ECQV05104JZ	5V 0.1	1	
C217	ECEA50ZR22	Electrolytic 50V 0.22	1		C252	ECQM1H104	Mylar 50V 0.1	1	
C218	ECQM1H223KZ	Mylar 50V 0.022	1		C253	ECQM1H102KZ	Mylar 50V 0.001	1	
C219	ECEA1CS470	Electrolytic 16V 47	1		C254	ECEA1ES4R7	Electrolytic 25V 4.7	1	
C220	ECEA1CS330	Electrolytic 16V 33	1		C255	ECEA1CS221	Electrolytic 16V 220	1	
C221	ECQM1H393KZ	Mylar 50V 0.039	1		C256,257	ECQM1H683KZ	Mylar 50V 0.068	2	
C222	ECQM1H473KZ	Mylar 50V 0.047	1		C258	ECQM1H104KZ	Mylar 50V 0.1	1	
C223	ECQM1H104KZ	Mylar 50V 0.1	1		C259	ECEA16N47	Electrolytic N 16V 47	1	
C224	ECQM1H683KZ	Mylar 50V 0.068	1		C260	ECEA1HS010	Electrolytic 50V 1	1	
C225	ECEA1HS010	Electrolytic 50V 1	1		C261	ECQM1H103KZ	Mylar 50V 0.01	1	
C226	ECEA50ZR68	Electrolytic 50V 0.68	1		C262	ECKW1H821KB	Ceramic 50V 820P	1	
C227	ECQM1H473KZ	Mylar 50V 0.047	1		C263	ECEA1CS221	Electrolytic 16V 220	1	
C228	ECEA50ZR1	Electrolytic 50V 0.1	1		C264	ECEA50ZR33	Electrolytic 50V 0.33	1	
C229	ECEA50N1	Electrolytic N 50V 1	1		C265	ECQM1H563KZ	Mylar 50V 0.056	1	
C230	ECQM1H393KZ	Mylar 50V 0.039	1		C266	ECQM1H103KZ	Mylar 50V 0.01	1	
C231	ECEA50N1	Electrolytic N 50V 1	1		C267	ECEA1ES3R3	Electrolytic 25V 3.3	1	
C232	ECQM1H393KZ	Mylar 50V 0.039	1		C268	ECQV05104JZ	0.1	1	
C233	ECEA50N1	Electrolytic N 50V 1	1		C269	ECEA1CS100	Electrolytic 16V 10	1	
C234	ECEA16Z10	Electrolytic 16V 10	1		C271	ECEA1CS330	Electrolytic 16V 33	1	
C235	ECEA50ZR1	Electrolytic 50V 0.1	1		C272	ECQM1H823KZ	Mylar 50V 0.082	1	
C236	ECEA50ZR33	Electrolytic 50V 0.33	1		C273	ECEA1CS100	Electrolytic 16V 10	1	
C237	ECQM1H562KZ	Mylar 50V 0.0056	1		C274	ECQM1H333KZ	Mylar 50V 0.033	1	
C238	ECEA1CS100	Electrolytic 16V 10	1		C275	ECEA1ES4R7	Electrolytic 25V 4.7	1	
C239	ECQM1H153KZ	Mylar 50V 0.015	1		C276	ECEA1CS100	Electrolytic 16V 10	1	
C240	ECQM1H103KZ	Mylar 50V 0.01	1		C278,279	ECEA1CS100	Electrolytic 16V 10	2	
C241	ECQM1H153	Mylar 50V 0.015	1						
C242	ECQM1H104KZ	Mylar 50V 0.1	1						
C243	ECEA1CS100	Electrolytic 16V 10	1						
C244	ECQM1H223KZ	Mylar 50V 0.022	1						
C245	ECEA1CS100	Electrolytic 16V 10	1						
C246	ECQM1H223KZ	Mylar 50V 0.022	1						

[illegible]

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks	Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
		SYSTEM CONTROL C.B.A.			Q630-632	2SD636(Q,R)		3	
					Q633-639	2SB641(Q,R)		7	
					Q640-642	2SD636(Q,R)		3	
		ICs			Q643	2SB641(Q,R)		1	
IC601	NW1400VY		1		Q644-648	2SD636(Q,R)		5	
IC602	TC5025BT		1		Q649	2SB641(Q,R)		1	
IC603	FS7805M		1		Q650,651	2SD636(Q,R)		2	
					Q653	2SD637(Q,R)		1	
					Q654	2SC1983		1	
					Q655	2SD636(Q,R)		1	
		Transistors			Q656-658	2SA886(P,Q,R)		3	
Q601	2SC1983		1		Q659	2SD636(Q,R)		1	
Q602	2SD636(Q,R)		1						
Q603	2SC1983		1						
Q604	2SD636(Q,R)		1						
Q605	2SC1983		1						
Q606	2SD636(Q,R)		1						
Q607	2SC1983		1				Diodes		
Q608	2SD636(Q,R)		1		D601,602	ERB12-01		1	
Q609	2SC1983		1		D603,604	ERB81-004		2	
Q610	2SA684(Q,R)		1		D605,606	MA150		2	
Q611	2SD637(Q,R)		1		D607	RD10EB		1	
Q612-614	2SD636(Q,R)		3		D608-624	MA150		17	
Q615	2SB641(Q,R)		1		D626	MA150		1	
Q616	2SD637(Q,R)		1		D627	RD6-2EB		1	
Q617	2SD636(Q,R)		1		D628-636	MA150		9	
Q618,619	2SB641(Q,R)		2						
Q620,621	2SD636(Q,R)		2						
Q622	2SB641(Q,R)		1						
Q623,624	2SD636(Q,R)		2				Resistors		
Q625	2SB641(Q,R)		1		R601	ERD10TJ392	3.9K	1	
Q626	2SD636(Q,R)		1		R602	ERD10TJ102	1K	1	
Q627	2SB641(Q,R)		1		R603	ERD10TJ222	2.2K	1	
Q628	2SD636(Q,R)		1		R604	ERD10TJ272	2.7K	1	
Q629	2SB641(Q,R)		1		R605	ERD25TJ681	1/4W 680	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks	Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
R606	ERD25TJ271	1/4W 270	1		R651	ERD10TJ223	22K	1	
R607	ERD10TJ103	10K	1		R652	ERD10TJ472	4.7K	1	
R608	ERD10TJ561	560	1		R653	ERD10TJ682	6.8K	1	
R609	ERD10TJ223	22K	1		R654,655	ERD10TJ223	22K	2	
R610-613	ERD10TJ102	1K	4		R656	ERD10TJ472	4.7K	1	
R614-617	ERD10TJ392	3.9K	4		R657,658	ERD10TJ223	22K	2	
R618,619	ERD10TJ223	22K	2		R659	ERD10TJ103	10K	1	
R620	ERD10TJ473	47K	1		R660,661	ERD10TJ223	22K	2	
R621	ERD10TJ562	5.6K	1		R662	ERD10TJ822	8.2K	1	
R622	ERD10TJ223	22K	1		R663	ERD10TJ333	33K	1	
R623	ERD10TJ103	10K	1		R664,665	ERD10TJ183	18K	2	
R624	ERD10TJ123	12K	1		R666	ERD10TJ562	5.6K	1	
R625	ERD10TJ153	15K	1		R667	ERD10TJ392	3.9K	1	
R626	ERD25TJ101	1/4W 100	1		R668	ERD10TJ223	22K	1	
R627	ERD10TJ333	33K	1		R669-674	ERD10TJ562	5.6K	5	
R628	ERD10TJ682	6.8K	1		R675	ERD25TJ103	1/4W 10K	1	
R629	ERD10TJ223	22K	1		R676-678	ERD10TJ103	10K	3	
R630	ERD10TJ153	15K	1		R679	ERD10TJ221	220	1	
R631	ERD25TJ104	1/4W 100K	1		R680	ERD10TJ103	10K	1	
R632	ERD25TJ334	1/4W 330K	1		R681	ERD10TJ152	1.5K	1	
R633,634	ERD10TJ563	56K	2		R682	ERD25TJ274	1/4W 270K	1	
R635,636	ERD10TJ222	2.2K	2		R683	ERD10TJ563	56K	1	
R637,638	ERD10TJ563	56K	2		R684	ERD10TJ561	560	1	
R639	ERD25TJ104	1/4W 100K	1		R685	ERD10TJ272	2.7K	1	
R640	ERD25TJ334	1/4W 330K	1		R686	ERD10TJ680	68	1	
R641	ERD10TJ103	10K	1		R687	ERD10TJ103	10K	1	
R642	ERD10TJ123	12K	1		R688,689	ERD10TJ332	3.3K	2	
R643	ERD10TJ223	22K	1		R690	ERD10TJ221	220	1	
R644	ERD10TJ472	4.7K	1		R691	ERD10TJ153	15K	1	
R645	ERD10TJ103	10K	1		R692,693	ERD10TJ103	10K	2	
R646	ERD10TJ123	12K	1		R694	ERD10TJ223	22K	1	
R647	ERD10TJ223	22K	1		R695	ERD10TJ222	2.2K	1	
R648	ERD10TJ472	4.7K	1		R696,697	ERD10TJ561	560	2	
R649	ERD10TJ103	10K	1		R698	ERD10TJ123	12K	1	
R650	ERD10TJ123	12K	1		R699	ERD10TJ332	3.3K	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks	Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
R6101	ERD10TJ562	5.6K	1		C611	ECKW1H103PF	Ceramic 50V 0.01	1	
R6102	ERD25TJ471	1/4W 470	1		C612	ECCW1H101JC	Ceramic 50V 100P	1	
R6103	ERD10TJ273	27K	1		C613	ECKW1H103PF	Ceramic 50V 0.01	1	
R6104,6105	ERD10TJ472	4.7K	2		C614	ECEA0JS470	Electrolytic 6V 47	1	
R6106,6107	ERD10TJ223	22K	2		C615	ECEA50ZR68	Electrolytic 50V 0.68	1	
R6108	ERD10TJ101	100	1		C616	ECEA1CS100	Electrolytic 16V 10	1	
R6109	ERD10TJ223	22K	1		C617	ECEA10Z22	Electrolytic 10V 22	1	
					C618	ECEA16N10	Electrolytic N 16V 10	1	
R6111	ERD10TJ392	3.9K	1		C619	ECKW1H103PF	Ceramic 50V 0.01	1	
R6112	ERD25TJ471	1/4W 470	1		C620	ECEA50Z2R2	Electrolytic 50V 2.2	1	
R6113	ERD10TJ102	1K	1		C621	ECEA0JS470	Electrolytic 6V 47	1	
R6114	ERD10TJ103	10K	1		C622	ECEA1CS100	Electrolytic 16V 10	1	
R6115	ERQ1CJ1R0	1W 1K	1		C623	ECKW1H103PF	Ceramic 50V 0.01	1	
R6116	ERD10TJ102	1K	1						
R6117,6118	ERD10TJ472	4.7K	2						
R6119,6120	ERD10TJ102	1K	2						
R6121	ERD10TJ472	4.7K	1						
R6122,6123	ERD10TJ103	10K	2						
RX601	EXB-P87473M	Complex Compo. (R) 47K	1				Miscellaneous		
RX602	EXB-P87562K	Complex Compo. (R) 5.6K	1		P601,602	VJP1092	2 Pin Connector	2	
					P603	VJP0089	3 Pin Connector	1	
					P604	VJP1090	7 Pin Connector	1	
					P605	VJP0089	3 Pin Connector	1	
					P606	VJP0091	10 Pin Connector	1	
					P607	VJP0097	8 Pin Connector	1	
					P608	VJP1092	2 Pin Connector	1	
		Capacitors			P609	VJP1100	9 Pin Connector	1	
C601	ECEA0JS470	Electrolytic 6V 47	1		P611	VJP0093	5 Pin Connector	1	
C602	ECEA1ES101	Electrolytic 25V 100	1		P612	VJP1092	2 Pin Connector	1	
C603	ECEA50ZR47	Electrolytic 50V 0.47	1		P613	VJP0089	3 Pin Connector	1	
C604	ECEA1CS101	Electrolytic 16V 100	1		P614,615	VJP1092	2 Pin Connector	2	
C605	EC1KW1H103PF	Ceramic 50V 0.01	1		P616	VJP1093	4 Pin Connector	1	
C606,607	VCKT1E103NX	Ceramic 25V 0.01	2		TP601	VJES0001	Test Point	1	
C608	ECEA1CS100	Electrolytic 16V 10	1						
C609	ECEA10Z100	Electrolytic 16V 10	1						
C610	ECEA0JS470	Electrolytic 6V 47	1						

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks	Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
		HEAD AMP C.B.A.			R592	ERD10TJ822	8.2K	1	
					R593	EVNK6AA00B13	1K	1	
					R594	ERD10TJ473	47K	1	
					R595	ERD10TJ471	470	1	
		IC			R596	ERD10TJ102	1K	1	
IC502	AN6320N		1		R597	ERD10TJ472	4.7K	1	
					R5185,5186	ERD10TJ561	560	2	
					R5187	ERD25TJ101	1/4W	100	1
					R5250	ERD25VJ101	1/4W	100	1
		Transistors							
Q513-515	2SD638(Q,R)		3						
		Diode					Capacitors		
D509	MA150		1		C501	ECCW1H150KC	Ceramic 50V 15P	1	
					C542	ECQV05104JZW	Mylar 0.1	1	
					C543	ECEA1CS470	Electrolytic 16V 47	1	
					C544	ECEA1CS100	Electrolytic 16V 10	1	
		Resistors			C545	ECEA1CS470	Electrolytic 16V 47	1	
R577	ERD25VJ100	1/4W 10	1		C546	TCKW1H103ZF	Ceramic 50V 0.01	1	
R578	ERD10TJ681	680	1		C547,548	ECEA1HS010	Electrolytic 50V 1	2	
R579	ERD10TJ103	10K	1		C549	ECEA1CS100	Electrolytic 16V 10	1	
R580	ERD10TJ272	2.7K	1		C550	ECKW1H103ZF	Ceramic 50V 0.01	1	
R581	ERD25VJ271	1/4W 270	1		C552	ECV1ZW50X44	Trimmer 1W 50P	1	
R582	ERD10TJ182	1.8K	1		C553	ECKW1H103ZF	Ceramic 50V 0.01	1	
R583	ERD25VJ100	1/4W 10	1		C555	ECV1ZW50X44	Trimmer 1W 50P	1	
R584	ERD10TJ473	47K	1		C556-558	ECKW1H103ZF	Ceramic 50V 0.01	8	
R585	ERD10TJ182	1.8K	1		C559	ECQM1H562KZ	Mylar 50V 0.0056	1	
R586	ERD25VJ100	1/4W 10	1		C560,561	ECCW1H330KC	Ceramic 50V 33P	2	
R587	ERD10TJ473	47K	1		C562	ECKW1H103ZF	Ceramic 50V 0.01	1	
R588	ERD10TJ273	27K	1		C5120,5121	ECCW1H680KC	Ceramic 50V 68P	2	
R589	EVNK6AA00B13	Variable 1K	1		C5122	ECKW1H103ZF	Ceramic 50V 0.01	1	
R590	ERD10TJ822	8.2K	1		C5124	ECKW1H103ZF	Ceramic 50V 0.01	1	
R591	EVNK6AA00B23	Variable 2K	1						

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks	Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
		Coils							
L507	VLQS66F2R2K	2.2	1		Q1116	2SD636(Q,R)		1	
L508	VLQS66F270K	27	1		Q1118	2SB643(Q,R)		1	
L509	VLT0083		1		Q1119	2SB641(Q,R)		1	
L510	VLQS66F2R2K	2.2	1						
L512	VLQS66F151K	150	1						
							Diodes		
					D1101	ERB81-004		1	
					D1102	SA2HF		1	
		Miscellaneous			D1103-1108	MA150		6	
P56	VJP1090	7 Pin Connector	1		D1110-1112	MA150		3	
P57	VJP1097	6 Pin Connector	1		D1113	RD5-6EB		1	
TP508-511	TJE98101	Test Points	4		D1114-1116	MA150		3	
					D1118-1120	MA150		3	
					D1121	RD6-2EB		1	
					D1122	MA150		1	
					D1124,1125	MA150		2	
					D1127	S1B01-01		1	
					D1128,1129	ERB12-01		2	
							Resistors		
		AVR C.B.A.			R1101	ERD25TJ152	1/4W 1.5K	1	
					R1102	ERD25TJ181	1/4W 180	1	
					R1103	ERD10TJ223	22K	1	
					R1104	ERD10TJ183	18K	1	
Q1101	2SD636(Q,R)		1		R1105	ERD10TJ223	22K	1	
Q1102	2SD638(Q,R)		1		R1106	ERD10TJ103	10K	1	
Q1103,1104	2SB641(Q,R)		2		R1107,1108	ERD10TJ102	1K	2	
Q1150,1106	2SD636(Q,R)		2		R1109	ERD10TJ563	56K	1	
Q1108	2SC1983		1		R1110	ERD10TJ103	10K	1	
Q1109	2SB641(Q,R)		1		R1111	EVNK6AA00B53	Variable 5K	1	
Q1110-1114	2SD636(Q,R)		5		R1112	ERD10TJ123	12K	1	
Q1115	2SB641(Q,R)		1		R1113	ERD10TJ103	10K	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks	Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
R1114	ERD10TJ223	22K	1		R1152	ERD25TJ474	1/4W 470K	1	
R1115	ERD25TJ561	1/4W 560	1		R1153	ERD25TJ394	1/4W 390K	1	
R1116	ERD25TJ104	1/4W 100K	1						
R1117	ERD10TJ152	1.5K	1						
R1118,1119	ERD10TJ563	56K	2						
R1120	ERD10TJ103	10K	1						
R1121	ERD10TJ223	22K	1						
R1122	ERD10TJ102	1K	1				Capacitors		
R1123	ERD10TJ473	47K	1		C1101	ECEA16Z22	Electrolytic 16V 22	1	
R1124	ERD10TJ103	10K	1		C1102	ECEA16Z47	Electrolytic 16V 47	1	
R1125	ERD10TJ473	47K	1		C1103	ECEA25Z100	Electrolytic 25V 10	1	
R1126	ERGIANG360	Metal Oxide 1W 36	1		C1104	ECKT1E103NX	Ceramic 25V 0.01	1	
R1127	ERD25TJ121	1/4W 120	1		C1105	ECEA16Z33	Electrolytic 16V 33	1	
R1128	ERD10TJ822	8.2K	1		C1106	ECEA1ES101	Electrolytic 25V 100	1	
R1129	ERD10TJ102	1K	1		C1107	ECEA25Z100	Electrolytic 25V 10	1	
R1130	ERD10TJ153	15K	1		C1108	ECQMIH223KZ	Mylar 50V 0.022	1	
R1131	ERD10TJ272	2.7K	1		C1109	ECEA1CS100	Electrolytic 16V 10	1	
R1132	ERD25TJ104	1/4W 100K	1		C1110	ECEA1CS101	Electrolytic 16V 100	1	
R1133	ERD25TJ562	5.6K	1		C1111	ECEA10Z22	Electrolytic 10V 22	1	
R1134	ERD10TJ102	1K	1		C1112	ECEA25Z3R3	Electrolytic 25V 3.3	1	
R1135	ERD25TJ561	1/4W 560	1		C1113	ECEA50Z1	Electrolytic 50V 1	1	
R1136	ERD10TJ152	1.5K	1		C1114	ECEA1CS100	Electrolytic 16V 10	1	
R1137	ERD25TJ471	1/4W 470	1						
R1138	EVNK6AA00B52	Variable 500	1						
R1139	ERD10TJ122	1.2K	1						
R1140	ERD10TJ333	33K	1				Miscellaneous		
R1141	ERD10TJ223	22K	1		RL1101	LC2EN	Relay	1	
R1142	ERD10TJ102	1K	1		RL1102	AW2934/AW22119	Relay	1	
R1143	ERD10TJ682	6.8K	1		TP1101,1102	VJES0001	Test Point	2	
R1144,1145	ERD10TJ123	12K	2		P1102	VJP1096	4 Pin Connector	1	
R1146	ERD10TJ102	1K	1		P1103	VJP0093	5 Pin Connector	1	
R1148	ERD10TJ563	56K	1		P1104	VJP1092	2 Pin Connector	1	
R1149	ERD10TJ473	47K	1		P1105	VJP1090	7 Pin Connector	1	
R1150	ERD10TJ103	10K	1		P1106	VJP0089	3 Pin Connector	1	
R1151	ERD10TJ333	33K	1		P1107	VJP1094	2 Pin Connector	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks	Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
P1108	VJP1096	4 Pin Connector	1				Resistors		
	VSCS0006	Heat Sink	1		R403,404	ERD25TJ104	1/4W 100K	2	
					R407	ERD25TJ181	1/4W 180	1	
					R409	ERD25TJ563	1/4W 56K	1	
					R410	ERD25VJ472	1/4W 4.7K	1	
					R411	ERD25VJ151	1/4W 150	1	
					R417	ERD25TJ562	1/4W 5.6K	1	
					R431	ERD25VJ472	1/4W 4.7K	1	
					R432	ERD25VJ104	1/4W 100K	1	
					R433	ERD25TJ223	1/4W 22K	1	
					R434	ERD25VJ104	1/4W 100K	1	
					R435	ERD25VJ332	1/4W 3.3K	1	
		AUDIO C.B.A.			R436	ERD25VJ273	1/4W 27K	1	
					R437	ERD25VJ223	1/4W 22K	1	
					R438	ERD25VJ332	1/4W 3.3K	1	
		IC			R439	ERD25TJ5R6	1/4W 5.6	1	
IC401	AN262		1		R442	ERD25VJ562	1/4W 5.6K	1	
					R443	ERD25VJ104	1/4W 100K	1	
					R444	ERD25TJ333	1/4W 33K	1	
					R448	ERD25VJ472	1/4W 4.7K	1	
		Transistors			R452	ERD25VJ562	1/4W 5.6K	1	
Q405,406	2SD639(Q,R)		2		R453	ERD25VJ272	1/4W 2.7K	1	
Q407	2SB643(Q,R)		1		R455	EVNK6AA00B24	Variable 20K	1	
Q408	2SB641(Q,R)		1		R456	EVNK6AA00B53	Variable 5K	1	
					R462	ERD25VJ100	1/4W 10	1	
		Diodes							
D401-403	MA150		3						
D404	MA150FV		1						
D405	VD1222		1						
D406	MA150		1				Capacitors		
D407,408	MA150FV		2		C401-404	ECEA1CS100	Electrolytic 16V 10	4	
D412-418	MA150FV		7		C405	ECEA1CS470	Electrolytic 16V 47	1	
					C406	ECEA1CS100	Electrolytic 16V 10	1	
					C418	ECKW1H471KB	Ceramic 50V 470	1	

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Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks	Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
R421	ERD25VJ333	1/4W 33K	1		C448	ECQV05274JZW	0.39	1	
R423	ERD25VJ102	1/4W 1K	1		C449	ECEA50ZR33	Electrolytic 50V 0.33	1	
R424	ERD25VJ333	1/4W 33K	1						
R425,426	ERD25VJ102	1/4W 1K	2						
R428	ERD25VJ103	1/4W 10K	1						
R429	ERD25VJ473	1/4W 47K	1				Coils		
R440	ERD25VJ273	1/4W 27K	1		L401	VLQ80F102K	1mH	1	
R441	ERD25VJ101	1/4W 100	1		L403	VLQ00F222K	2.2mH	1	
R446	ERD25VJ221	1/4W 220	1						
R447	ERD25VJ682	1/4W 6.8K	1						
R448	ERD25VJ472	1/4W 4.7K	1						
R450	ERD25VJ333	1/4W 33K	1						
R457	ERD25VJ330	1/4W 33	1						
R458-461	ERD25VJ333	1/4W 33K	4						
R463-465	ERD25VJ333	1/4W 33K	3						
							KEY BOARD C.B.A.		
		Capacitors							
C407	ECQM1H33KW	Mylar 50V 0.033	1						
C408	ECEA50Z1	Electrolytic 50V 1	1						
C413	ECKWIH103PF	Ceramic 50V 0.01	1				Diodes		
C414	ECEA1CS100	Electrolytic 16V 10	1		D6306-6313	MA150		8	
C415	ECEA0JS101	Electrolytic 6.3V 100	1		D6314-6322	BR5504S		9	
C416	ECEA50ZR22	Electrolytic 50V 0.22	1						
C417	ECEA1CS100	Electrolytic 16V 10	1						
C419	ECQM1H562KZ	Mylar 50V 0.0056	1						
C420	ECEA1HS010	Electrolytic 50V 1	1				Resistors		
C421,422	ECEA1CS100	Electrolytic 16V 10	2		R6302-6308	ERD25TJ271	1/4W 270	7	
C424	ECKWIH103PF	Ceramic 50V 0.01	1		R6309	ERD25TJ221	1/4W 220	1	
C432	ECQM1H224KZ	Mylar 50V 0.22	1		R6321	ERD25TJ271	1/4W 270	1	
C433	ECEA50ZR1	Electrolytic 50V 0.1	1						
C447	ECQM1H104KZ	Mylar 50V 0.1	1						

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks	Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
		LOADING/UNLOADING COMPLE-					SWITCH C.B.A. UNIT		
		TION SWITCH C.B.A.							
P6302	VJP0092	3 Pin Connector	1		D6323	RD8-2EB	Zener	1	
							Resistor		
					R6310	ERD25TJ123	1/4W 12K	1	
		F.F. MICRO SWITCH C.B.A.							
							Miscellaneous		
D6324	ERB12-01	Diode	1		SW6309	VSTS0005	Switch	1	
SW6314,6315	VSMS0001	AH25249 Micro Switch	2		SW6310	VSTS0018	Switch	1	
					SW6311	VSTS0005	Switch	1	
					BM6301	VSES0001	Battery Meter	1	
		SENSOR LAMP C.B.A.							
PL6301	XAMV12S	Sensor Lamp	1						
							INPUT SELECTOR C.B.A.		
		REEL SENSOR C.B.A.					Transistor		
					Q402	2SA636 (Q,R)		1	
C6301	ECEA1CS100	Electrolytic Capacitor	1						
		16V 10							
P6301	VJP0089	3 Pin Connector	1						

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